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Electro-Pneumatic Protector.

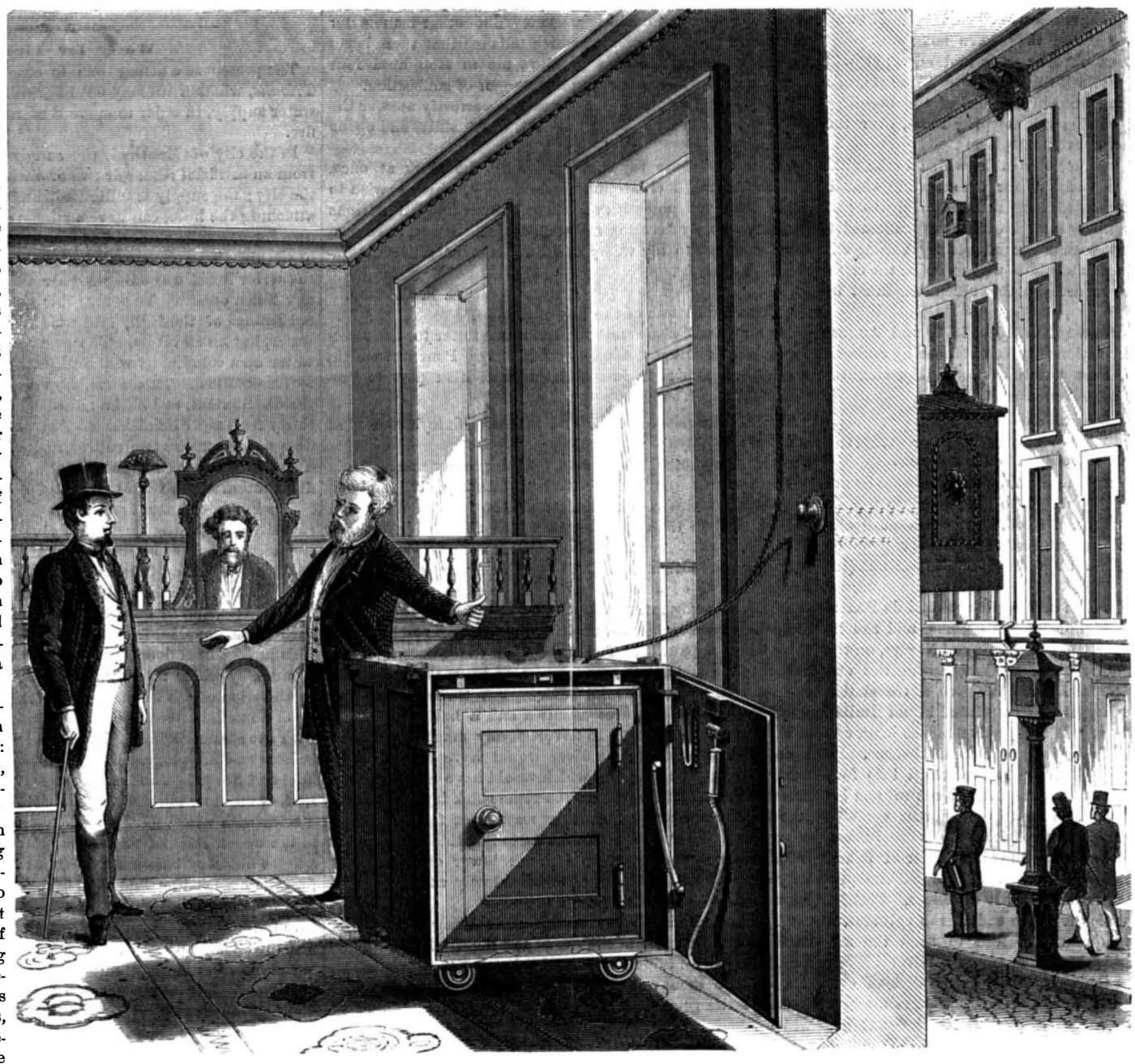
We illustrate, in the accompanying engraving, a very unique invention, which, so far as we can at present see, appears to afford absolute protection to safes or vaults to which it is applied; and it does this without necessitating great strength in the walls of such safes or vaults, and the consequent expense attending their construction.

It has been shown that burglars have been able to keep pace with the inventions, that have sought to defeat them by sheer strength of brute material, except where a large expense is incurred to so pile plate upon plate, and to temper and harden, till the time necessary to penetrate these combined obstacles is greater than that through which safes or vaults are generally left, unprotected by the proximity of honest people.

So confident are the inventors that the method of protection about to be described is absolutely certain to sound such an alarm, in case of attack, as would at once summon assistance, that they invite the closest investigation, and challenge the severest trial of their claims, especially by scientific electricians, as the gist of the invention consists in a most ingenious application of electricity to sound an alarm when the safe is tampered with, in the slightest degree, with a view to enter it.

The general principle of its action may be stated thus:

The protector, when closed, completes a battery circuit, which is broken by either opening the door or penetrating the walls to a depth equal to that of a single plate of tin. The breaking of the circuit releases the armatures of electromagnets, which, in their movement away from the magnets that previously held them, unlock a train of clockwork placed in a position inaccessible to burglars, and in itself burglar proof, so far as iron and steel casing can make it. This clockwork, once set in motion, sounds an alarm for at least one hour, and can only be stopped by a person who knows the combination upon which it is set, this being in principle like the standard combination locks now generally used on bankers' safes and vaults.



DUNCAN & ROWELL'S ELECTRO-PNEUMATIC PROTECTOR FOR SAFES AND VAULTS.

The clockwork magnets are connected with that portion of the apparatus that surrounds the safe, by a peculiarly constructed cable, the junctions being arranged in a manner to be hereinafter described.

Around the safe to be protected is placed a double walled sheet metal case, the space between the walls being filled with corrugated wood to give the case rigidity. The door of the case is made in the same manner; but its interior space is connected with the air space of the rest of the case by means of a flexible rubber tube.

In the center of the top of the protector case, and on its inner wall, is a collapsible disk, which, when uncollapsed, springs toward the inclosed safe, and breaks all the circuits by moving against the end of an insulated pin, as hereinafter described.

The disk is collapsed by exhausting the air, from the connected air spaces in the protector case, through the agency of a small air pump, connected by a flexible tube with the air space in the door. This pump is shown, suspended on suitable supports on the inside of the door where it is hung when not in use, in our engraving. A mercury gage is also shown on the door, which indicates at all times whether the exhaustion is complete or not.

On the inside of the door, in any convenient position, is permanently attached a wedge of copper. This wedge is shown at the middle of the top of the door in our engraving. When the door is closed, this wedge is forced in between the ends of two strips of copper, establishing an electric circuit between the protector case and the alarm apparatus, which is shown in our engraving, attached to the front of the building in which the safe is placed.

The ends of the copper strips, opposite the wedge on the door, are connected, one with the wires of a galvanic battery, and the other with the wires comprising the wires of the cable, which connects the protector case and the alarm. The upper copper strip, nearest the collapsing disk, is made of two pieces, the end of one piece lapping on to the other directly opposite the central part of the disk. The two pieces are so sprung together that they will remain in contact when left undisturbed.

Now the moment the outer shell of the protector case is tapped, the collapsible disk, being relieved from the external pressure of the air, springs into its original position, and, coming in contact with the insulated pin (above referred to, and which is affixed to the inner movable piece of the upper copper strip leading from the wedge in the door to the disk), separates the ends of the pieces and breaks the circuit.

The cable is composed of six wires perfectly insulated from each other. Three of said six wires are firmly twisted together to form the core or center of said cable; and the other three are braided firmly together and wound around said core, and form the outside of the cable. Any attempt to untwist the outside wires necessarily involves the twisting of the inside ones still harder, and, if any considerable force is exerted, will rupture one or more of the inside wires, and of course break the electric circuit.

There are three pairs of electromagnets used in the alarm mechanism, and three distinct electric circuits flow through the cable. To the first magnet the current passes through one of the outside wires, and returns through one of the central wires. To the second magnet, it passes through a central wire and returns through an outside one. To the third magnet, the other outside wire conducts the current, which returns through the remaining central wire. The severing of any one of the wires of the cable will relieve the armature on one of the magnets and instantly spring the alarm as effectually as if the whole six wires of the cable were cut.

As a closed circuit is employed, it is necessary to separate the negative from the positive wires of the cable, and to connect the three negative wires of the cable to the negative pole of the battery, and the positive wires of the cable to the positive pole. There are two outside wires and one central wire that belong together, and which must be connected to one pole of the battery, and one outside wire and two central wires that work together and must be connected with the other pole of the battery. If any person should attempt to attach a second battery to any part of the cable for the purpose of keeping the magnets charged, it would first be necessary to separate the positive from the negative wires in the cable, get at the central wires and test them, and also test the outside wires, to ascertain which are negative and which are positive, before attaching the second battery and before venturing to sever any one of the wires of which the cable is composed. Now to get at these wires so as to test them is deemed an impossibility, as the method of twisting is such that no wire can be traced.

From this it will be seen that the electric current, generated in the battery, passes through the battery wire to one of the strips of copper: then—when the door is shut and the air space exhausted—through the wedge of copper on the door to the other copper strip, and through that to the lap joint above described, and, passing that joint, enters the cable and flows through the helices of the magnets It is obvious that if the door be opened the electric current must be broken by the withdrawal of the copper wedge, and the alarm instantly sounded. So, also, if the copper strips are separated at their lapped joint, as they certainly must be by the pressure of the disk whenever air is let into any of the air spaces of the case, the elecrical circuit will be instantly broken and the alarm sounded.

It is claimed that the cost of battery power will not exceed three cents per day. The battery requires attention only once a week, such adjustment occupying less than five minutes' time, and it is intended to ultimately use a battery that will run for a year or more without any attention. The battery can be placed in any position where most convenient. There are no fumes or odors arising from it, and it is harmless and inoffensive. It can be kept in order by a servant, a galvanometer indicating whether it has received proper care.

To use the "Protector" requires no knowledge of electricity. It is only necessary to learn to operate a combination lock attached to the alarm box. This alarm consists of two double bells, struck two thousand times per minute, and a large gong bell, struck once in twenty seconds. When started it will

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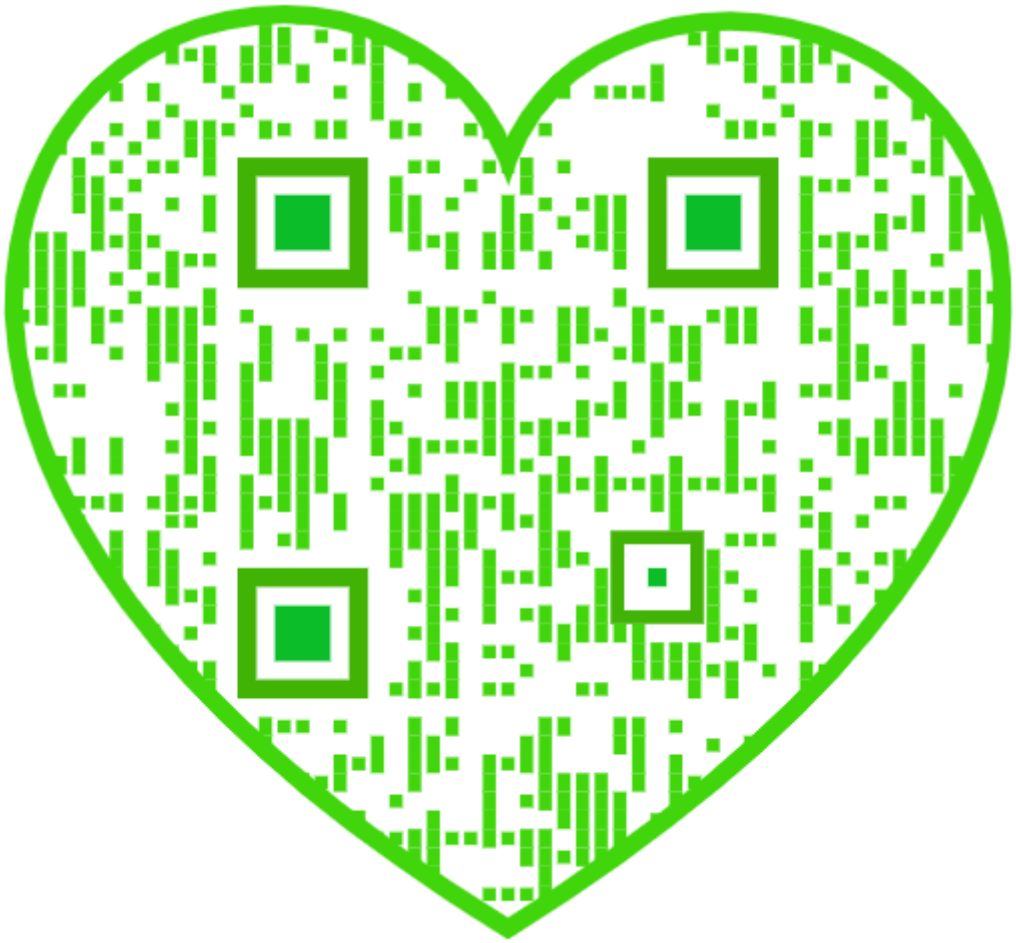

run for an hour or more. The alarm is placed in a strong iron or steel box, and set into or bolted upon the outside wall of the building, over the sidewalk, in plain view and hearing of the police and others in the street. The box, from its construction, strength, and position, is believed to be burglar proof. It cannot be reached without a ladder, nor worked upon without lights. Any one attempting to get at the alarm would be discovered.

The alarm box can be placed outside, on either story of the building, or in any room of the building, or at any point, however distant away from the building. Two or more alarms can be used when deemed necessary. One is shown in our engraving, supported on an iron post, placed at the outer edge of the sidewalk.

The alarm is easily and securely controlled by the knob of the combination lock inside of the room, and does not require over one minute per day to shut it off and on. The alarm once started cannot be stopped by any one, except the person knowing the combination of the lock. Any attempt to remove it from its position would break the circuit and set it going, when it would run in any position, and could not be stopped by any one ignorant of the combination upon which it was set.

For private residences the protector affords perfect security for all the more valuable property in the house. A good fireproof safe protected in this way is all that is required for a private house. The instant the burglar opens the door of the case, the alarm begins ringing, and notice is given inside and outside that burglars have effected an entrance. If burglars are heard in the house, and they have not approached the safe, the alarm can at once be set in motion, which will either drive them away, or call in the police. The safe, in a private residence, can be placed in any part of the building, and the alarm placed outside the sleeping room, over the sidewalk, or in any other convenient place.

The impossibility of tapping the cable, which is the vital point of the invention, is vouched for by scientific electricians, who have experimented long and arduously to test whether this could be done or not. No one has yet succeeded is establishing a current with a second battery through it without starting the alarm, and those who examine the cable will see that, to do this, insurmountable difficulties must be met with.

The invention was patented Nov. 15th, 1870, and August 1st, 1871. Further information may be obtained by addressing Hon. A. H. Cragin, Post building (Room 13), Hanover street, corner Beaver street, New York city.

An Italian Diving Bell---The Inventor Writing Letters at the bottom of the Sea.

The *Tolpa marina*, or marine mole, is a recent invention of Signor Toselli, of Naples, by which he descends into the sea with plenty of air and plenty of room, and is enabled to continue, for four hours, his minute scientific observations on surrounding submarine life at a depth of 31 fathoms (186 feet) under water.

This wonderful machine has been built at Sestri de Ponente, near Geneva, after Signor Toselli's plans, and the inventor made his first experiment in the Bay of Naples, on the 26th of August, in the presence of the local authorities and several officers of the Royal Navy. We give a translation of a description of the apparatus as printed in an Italian periodical, *L'Italia Nuova:* "It is 4 yards 8 inches long, cylindrical in form, and made entirely of iron and bronze. Its diameter is about 1 yard 4 inches. It is divided into four superposed compartments or diaphragms, the central one being reserved for the divers. The upper chamber contains the compressed air necessary for respiration during immersion. The lower chamber acts like the air bladder of fishes, as it increases or diminishes the weight of the machine proportionably to the quantity of water it displaces. Finally, the last compartment, which is at the end of the cylinder, is filled with the necessary quantity of lead to keep the machine in a vertical position, like an aerometer. Several holes, fitted with bronze round the surface, admit of various contrivances, without which it would be incomprehensible how a man, hermetically shut up in what may be called an iron castle, could catch external objects, secure them by the means of ropes, and collect them."

The same paper, in its following number (August 28) adds: "We have received letters from Naples, which confirm the reported success of Signor Toselli's first descent into the Bay of Naples, by means of his diving apparatus, at a depth of 35 fathoms—namely under a pressure of six atmospheres. . . The weather could not have been lovelier, nor the sea more calm. As soon as the crowd of distinguished invited witnesses had arrived at Baja—the chosen place for the experiment—they were met by Admiral de Viry and his staff.

"The experiment began about noon. After soundings had been taken, the machine, then empty, was sunk into the sea, and left for some time at the depth of 30 fathoms, to try if it would bear that pressure without being smashed; as soon however, as it was again seen floating upon the surface of the water without having received the slightest injury, the bystanders ceased to entertain doubts of Signor Toselli's safety, whilst he, perfectly calm, got into his marine mole, and descend d slowly to the bottom of the sea. The lowering of the machine through 30 fathoms of water took three and one half minutes. When, after awhile, it was seen floating again, and when the lid opened, and Signor Toselli came out smiling and serene, cheering burst out on every side.

"During his sojourn at the bottom of the sea Signor Toselli wrote the following report of his experiment to the well-known director of the Royal Observatory of the Vesuvium, Signor Palmieri, who was a witness of the experiment, and expressed himself highly satisfied with it:

"Sir: The sensations I experience at this moment are so strange and numerous, that, should I wait to write them down, I am sure they would slip from my memory.

"First of all I must tell you that the water here does not look like itself any longer, but seems really to be a motionless mass of transparent glass, quite luminous enough to allow of reading and writing.

"The bottom of the sea seemed at first to hurry towards me; then I saw it stop, and after a while glide away from me. I was quite astonished at this, and almost feared lest my eyes should be diseased; but by observing that the movements of the manometer kept in direct communication with the sea, I felt reassured, having at once surmised the cause of the apparent movement. When I fancied the bottom of the sea was running towards me, it was a proof that I was sinking with a certain speed; when the bottom seemed to have stopped moving, it was myself in fact who did not move; and when the bottom sunk rapidly as if running away from me, I was then ascending towards the surface.

"It is very amusing to see so many fishes swimming to and fro on all sides, and to be able to enjoy a curious spectacle without experiencing the slightest inconvenience.

"Such silence prevails here that it would seem terrible to some people; but I consider it, on the contrary, a peculiar sort of pleasure to breathe in such a medium.

"The barometer marks 81 centimeters of pressure, the igrometer in my cell indicates 26 degrees, and the one outside only 15. The manometer communicating with the sea shows the depth to be 31 fathoms. The other manometer still marks two atmospheres, which tells me that there is yet air enough in the chamber to allow me to stop here four hours longer, without running any danger of suffocation.

"All the contrivances of my machine perfectly answer the purpose I had in view, except the lid, which shuts and opens too slowly.

"I can venture to say that I have hit the mark at once. This makes me feel an indescribable joy, which I wish to share with you, and with all those honored and illustrious persons, who, by favoring me with their presence, have generously offered to my weary mind the best of all remunerations. Yours, &c.

"G. B. TOSELLI.

"From the bottom of the Bay of Naples."

Signor Toselli also wrote the following letter to the directors of the engine manufactory at Sestri di Ponente, which, we think, is almost as full of interest as his report to Professor Palmieri:

"*Messrs. Westermann Brothers, Engine Manufacturers, at Sestri*:

"I inform you, without delay, that I put my marine mole to the test yesterday, before several military, civil, and scientific authorities who had told me that the sea was much deeper at Baja than anywhere else in that neighborhood. They kindly deceived me out of anxiety for my life, for on reaching the bottom I could read on the manometer that the depth, instead of being 55, as I had wished, was only 31 fathoms. At any rate the depth to which I have descended is far below the depth which divers have as yet reached with their usual apparatus. The time, from the moment I signalled telegraphically for my departure from the bottom of the sea, to my arrival at the surface, was three minutes, as some bystanders said three minutes and a half, which constitutes a great difference in favor of my machine, if compared with what a common diver would have been able to achieve with his apparatus, which would have employed not less than 70 minutes to pierce the same thick layer of water. It is well known that the greatest number of fatal accidents occurring to divers are to be ascribed to the sudden transition from a very high pressure to a much lower one, and that they can only avoid this by ascending slowly at the rate of forty inches per minute, and not more.

"The pressure inside my marine mole being exactly the same near the surface of the sea as at a depth of 55 fathoms, I could dart with impunity from the bottom to the surface, like a fish, without experiencing any pain in my lungs. This is one of the greatest advantages of my invention, and of which I had not even thought or hoped before.

"I wish to share the pleasure of my triumph with all the clever mechanics of your establishment, who have built my machine with so much care. By acting thus towards them, I do nothing else than my duty, because I know how few people do justice to the great merit of those, who, with their tools and their exhausting labor, succeed in giving a *de facto* existence to the products of intelligence."

A New Gold Field.

The St. Paul *Press* says that great excitement now prevails at Winnipeg, Canada, over recent gold discoveries at Lake Shabondawan. Many specimens of gold dust, nuggets, and gold bearing quartz had been brought to Fort Garry, and, so confident were the people in general that a new Eldorado of unsurpassed richness had been discovered, hundreds at once repaired to the scene of the discoveries; and the latest information from that region has not only fully confirmed all previous reports, but exaggerated them to the extent of placing them among the richest mineral deposits in the world, outranking even California and Australia.

The government of the Dominion of Canada is engaged in establishing a road through the country between Fort William, on Thunder Bay, and the settlement on the Red River Valley, but all work on this thoroughfare has been entirely suspended, the workmen, to the number of several hundreds, having dropped their shovels, picks, and axes, and emigrated in a body to the gold fields, where they were each washing out with their hands four dollars and upwards. News of their remarkable success in finding gold in paying quantities had infected the sober citizens of Winnipeg, and the prospects seemed to be that even the fears of a Fenian raid from Pembina would be forgotten in the general desire to revel among the golden sands of the Shabondawan.

There would seem to be some foundation for these reports, for the locality mentioned is in the midst of one of the richest argentiferous regions on the continent. The early explorers of a route through the British possessions discovered gold and silver in this vicinity, and later investigations have shown that vast deposits of minerals are to be found along both shores of the great lake. Lake Shabondawan lies about forty miles due west from Fort William, and at least 400 miles from Fort Garry. This lake is only about ten miles in length and but two or three in width, and forms one of many small bodies of water in that section. It is bounded on the south and west by a mountainous and broken country, through which flow several small and rapid streams.

Lake Shabondawan is but a short distance from Silver Islet in Lake Superior, said to be the richest silver mine in the world, and not over 150 miles distant from the copper mines of Ontonagon. There are, therefore, reasonable grounds for believing that these discoveries may prove to be as valuable as they are reported, and that the extensive prospecting of experienced gold hunters, which is sure to follow, may yet develope mineral resources north of Lake Superior as vast as those which have attracted hundreds of thousands of people to the western slopes of America and the islands of the Pacific.

Water for Fires.

The present is a fitting time to consider, says the Chicago *Tribune*, whether we may not improve our present system of water supply, in order to make it more efficacious in case of fire.

In the city of Montreal, the supply of water is obtained from an artificial reservoir two or three hundred feet above the city; the supply is unlimited, and any householder, by attaching the hose, can have a stream of water, which, by its own force, can be thrown 123 feet high against the resistance of the air. This obviates the necessity of steam fire apparatus, the water itself ascending higher than it can be forced by any steam engine. To secure this same result is the principal feature of the Holly system. We have an abundance of water, but no elevation. The great steam pumps force the water up a column, by which a head of less than one hundred feet is obtained. This force, however, is not maintained in the distribution, and half a mile distant it does not rise above thirty feet, and diminishes until at a distance of two miles it does not rise above twelve feet, and often not over six feet. This arises from the impossibility of the pumps keeping the distribution mains full at all times.

The inflow of water from the lake is far in excess of the capacity of any existing machinery. From the wells of the tunnel, there might be supplemental tunnels to various points of the city. Other tunnels might be constructed into the lake. The city might be divided into fifty or more convenient fire districts, and in each of these districts there might be such wells, supplied from the lake, incapable of exhaustion. This having been done, there might be erected over each well a pump, by which this water could be given a force equal to an elevation of one hundred feet. This would place the public in a much better condition, as against fire, than it is now with the steam engines. The main items then needed would be hose and fire plugs. Every building could have its own hose and fire plugs, and upon the first appearance of fire, the roof, or any room in the highest building, could be instantly flooded with water. At present, an ordinary fire, occurring in the upper story of any large building, has time to obtain a fierce headway before the engines reach the place; and, before the hose can be laid and dragged up ladders, and the water forced to that hight by the engines, it is impossible to save the building. In the case of the Drake-Farwell Block fire, thirteen months ago, the water could not be forced to to the roof, and building after building burned from the roof downward. The engines could not force the water to that hight. Had there been a head of water ascending seventy-five feet, one man standing on the roof with hose could have confined the fire to the building in which it originated, and the loss on even the latter might have been prevented. In Montreal, there can be no extensive fire resulting from an insufficient supply of water or insufficient force. Each man, with sufficient hose, can exercise as much power as can be used by a steam engine in Chicago. As this water can be thrown from the roofs of the highest building as far upward as it can be thrown by a steam engine from the ground level, no machinery or steam power is required in order to make the water effectual against fire. The wells for the supply of water for fire purposes could easily be obtained from the river. The piping for that purpose can be easily laid, and of a much cheaper material than that used for the general distribution. This same water could be used for manufacturing purposes, for livery stables, and for a variety of purposes, thereby reducing the demand upon the present water works. It would be comparatively inexpensive. The machinery once erected, the cost of working it would be but trifling. The cost of piping could not be one fifth of the cost of the ordinary water mains. This pipe could be laid at once in every street in the city, and the annual cost of maintaining the whole would not equal one third that of the requisite number of steam engines under our present system. We might erect water towers in each fire district and obtain additional head, but either plan is feasible to supply the great natural want of Chicago, a supply of water from an elevation. That want must be supplied. Our present system cannot do it, and now is the time to consider and adopt some plan by which the end can be obtained.

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Toys as Teachers.

The primary use of toys to children, says a writer in *Chambers' Journal*, is to keep them occupied. A mother thinks what her infant, even when only a few months old, requires to amuse him, and she selects a bright colored bird, or a rattle, or something which it can feel, shake, and look at. An elder child complains of having nothing to do; and a toy or game is found, or a book of pictures or little stories with which he may amuse himself. The great aim of all those who understand the bringing up of children is to keep them constantly engaged, and at the same time, though encouraging them to play as long as possible with one toy, yet to change and vary their occupations and amusements as soon as they show signs of mental fatigue or weariness. This constant employment is not only desirable for children, but is really essential for them; they must be doing something, and, as has been well remarked, even mischief is but misapplied energy. Toys are the natural instruments on which this energy and activity should be expended. It is the province of the toy dealer to find objects for the exercise of their minds and fingers, just as much as for the baker to supply them with bread, or the shoemaker with shoes.

Children are essentially active in every sense; and toys can not properly be called toys at all if they are merely capable of being looked at, and do no more than amuse the eye for a few moments. This fact will often account for the peculiar way in which children take fancies to their toys. Of course the glitter of a new thing, whatever it may be, lasts for some time; but it will be remarked how they generally return to some old plaything, long since bereft of its beauty, because they can *do something with it*. A broken doll, even with no legs and arms, may be dressed and handled as a baby; a horse without legs may be dragged about the floor, and so on; whereas, a new picture book is soon put aside, after the novelty of the illustrations is forgotten; and a very elaborate mechanical toy, too delicate even to be handled, is not much cared for after it has been exhibited a few times and has ceased to be a novelty.

While carefully avoiding the mistake of making play a lesson, some few toys, if well selected, may impart a vast amount of instruction, and that without the child having to undergo any undue mental strain. It would, of course, be undesirable to give a little boy five or six years old a direct lesson on the principles of the bridge and the use of the keystone. Give him, however, a box of bricks capable of making a bridge with the centering, and show him how to put it together; he will puzzle over it for days, try every sort of arrangement, and unwittingly become gradually and practically acquainted with some important mechanical laws. Again, a little model of a steam engine made to work by gas or spirit, which may be bought for a few shillings, is a most attractive toy. Children will watch it for hours. They see the water poured in; they remark that it is made to boil, and soon has to be replenished; they notice the action of the valves, the piston, the crank, and all the parts. When they come to study the theoretical laws of steam and machines, half the difficulty of their first lessons vanishes. If, during his play, the child is so fortunate as to have a really educated nurse or mother, herself acquainted with the outlines of such general knowledge, the child's play may be made, by simple toys, far more educational and interesting than any set lesson, and the result of the instruction far more fixed on his mind than the simplest theoretical idea could ever be by any number of repetitions and learnings by heart.

What is true concerning the box of bricks and the model engine, is also true of a number of other toys; that is, they depend for their action on certain laws, with which, by a little skill, children may be made practically familiar without any undue taxing of their minds, and during the time they are engaged in play. Of these may be mentioned, the kite, magnetic fish; hydrostatic toys, with water-wells, fountains, etc.; pneumatic toys, such as pop-guns, etc.; tops of all sorts, the kaleidoscope, the magic wheel, etc. All these involve scientific laws, which a child may understand familiarly, with no more difficulty, if properly put before him, than he usually finds in learning to read.

Cookery, as a regular subject of instruction in girls' schools, has hitherto been looked upon as one of those things which, though no doubt desirable, is, unfortunately, impossible. Toys, however, seem to prove that this is a mistake. Judging from the collection of cooking stoves which Mr. Cremer has brought together in his International collection of toys in the Exhibition this year, it is clear that "pretending to cook" is largely played at by children of all countries. These stoves, though in miniature, are made large enough, and are so fitted for gas, as to be capable of dressing a small dinner. It would seem that, by a regular course of instruction in practical play cooking, a most agreeable and permanently useful *game* might be introduced in all schools, to the immense advantage of all classes.

The dressing of dolls may be made a most pleasant mode of teaching a little girl to work. All girls are fond of dressing their own toy babies, though they soon weary of hemming dusters. By making dolls' clothes exact miniatures of children's garments, so that they will take on and off, agreeable occupation in needlework will be found for a little girl. The child will easily be made to take a pride in having all her doll's wardrobe as neat and well worked as she can; and good habits of care, neatness, and order may thus be inculcated. In this way, as has already been pointed out, play, useful instruction, and training may be combined through the agency of toys. In watching a little girl play with her doll, an insight may often be obtained into the mode in which the child herself is being brought up. When young we all imitate more or less the habits and manners of our elders; and in whichever way a child is seen using her doll, whether it be roughly, kindly, or gently, or by making a great fuss over its appearance, such as thinking chiefly of the fashion of its dress and ornaments, so may the characteristic features of the treatment that the child herself receives at home be frequently inferred.

The cost of toys cannot be taken as a guide to their usefulness or value. To a certain extent, as in all other articles, it is true that good playthings cannot be had for nothing, but the most expensive playthings are by no means necessarily the best. Nothing is more desirable than to encourage children as much as possible to make some of their own toys; when they do this it affords them immense pleasure and amusement. It should also be borne in mind that the fewer playthings a child has in use at the same time the better. Too many at once encourage restlessness and a continual want of change and variety, and prevent habits of attention and contentment being developed.

Heating and Preparing Stone for Pavements, etc., by the direct application of Steam.

Mr. Campbell Allen, of Albany, New York, has made use of the direct application of steam to heating and drying broken stone or gravel for laying pavements, sidewalks, roadways, or for roofing or other purposes.

The stone or gravel to be heated is placed in a steam tight retort of strength and construction suitable to withstand the steam pressure attending the degree of heat needed in the process. The door or head through which the retort has been charged being securely and tightly closed, steam of the requisite heat and pressure is let in through a pipe directly among the stone or gravel to be dried and heated. The steam expels the air through a cock at the bottom of the retort, which cock is left open for the purpose until the air and a portion of the condensed water has escaped. This escape-cock then being closed, and the action of the steam continuing, the mass in the retort soon becomes heated to the temperature, or nearly to it, of the boiler from which the steam is derived. When this point has been reached, communication with the boiler is cut off, a cock in the retort is opened, and the steam from the latter allowed to escape. The heat in the mass of material will, if sufficient, convert at atmospheric pressure all the condensed water therein immediately into steam, leaving the mass dry and hot. The mass in the retort must be raised sufficiently above 212° that the temperature above that point is sufficient to convert all the condensed water in the mass into steam; otherwise the mass would be discharged at 212°, but leaving the stone wet. But the amount of heat contained in the condensed water thus converted into steam is very considerable, and, to save this, the steam is conveyed into another retort charged with material like the first. The steam rushing in among the material in the second retort imparts its heat thereto, and is condensed thereby, thus saving the heat.

The direct application of steam to the broken stone or gravel to be heated is chosen because of its capacity when applied under pressure to circulate quickly throughout all the spaces and crevices, and convey the heat so as to apply it to the whole mass at once, with but little of the loss which is incurred, by the escape of the heat from the surface while penetrating to the interior, when applied as in the common way to the exterior of the vessel containing the gravel.

Another object attained by using steam for heating the gravel is the facility with which the heat (or that part of it remaining in one vessel after the work is accomplished), greater than that required for the gravel when used, may be transferred to another vessel containing gravel to be heated, and in exhausting from the retort, in which it is confined with the heated gravel, to another containing cold gravel or stone to be heated, thus converting all the water in the first retort into steam instantly, which, escaping, will leave the gravel or stone, hot and dry, fit for use.

This invention, for which letters patent have been recently secured through the Scientific American Patent Agency, has been practically used with great success during the past summer in heating broken stone for concrete paving, and has shown itself to be much more economical than any method of heating stone hitherto employed, only about one tenth the fuel being required, to heat the stone in this way, that was consumed by the old method.

Himmer's Improvement in Electric Batteries.

The improved battery which forms the subject of the present notice is the invention of Vitalis Himmer, of the city of New York, and it is claimed that the arrangement employed permits the power to be regulated at will, and that a supply of its source of power can be attached to it to keep it operative, for a length of time practically limited only by the supply of the material. The battery cup is made of glass or other suitable material. A small vessel of truncated conical form is placed upon the bottom of the battery cup. A vessel of suitable size and shape is filled with sulphate of copper and water, and provided with a neck, through which a small tube is fitted, this tube being preferably held in a cork, in which it may be shifted up and down and still held secure. This vessel is inverted, and placed upon the battery cup, so that its tube enters the truncated conical pot, placed in the battery cup, to a greater or less depth. The copper element of the battery is placed in this pot. The zinc element of the battery is placed within the upper part of the battery cup, and held there by its own spring pressure.

The outside battery cup described being filled with salt water, the vessel holding the sulphate of copper and water is inverted over the cup, its tube entering the pot. The upper end of the tube is preferably closed; and small perforations are cut near the top through it, so that they will not be liable to become clogged by pieces of sulphate of copper. The water in the inverted vessel will gradually dissolve the sulphate of copper, the solution flowing into the pot containing the copper element, where, on account of balanced pressure, it will rise no higher than the lower end of the tube. That amount of surface of copper which is in actual contact with the above named solution will be active in the battery, but not the remainder. The depth, to which the tube is immersed, and the consequent hight of the sulphate of copper solution, determine, therefore, the strength of the battery. The zinc will, by the contact with the water, always be ready for action, the spent zinc dropping to the bottom of large battery cup, but not into the pot containing the copper element.

When the battery is active, the solution in the latter will be gradually absorbed and a new supply constantly given down in such ratio as is necessary to provide the active effectiveness of the battery. When the battery is not used there will be no displacement of solutions. The cup containing the sulphate of copper and water may be secured upon the battery cup in such manner as to secure it air tight, in which case evaporation is absolutely prevented. A battery of this kind can, it is claimed, be kept in effective operation continuously for years, without requiring the least addition or replacement of parts, provided the copper and zinc are of sufficient size, and the supply vessel large enough to hold the requisite amount of the sulphate of copper.

In a recent notice of this battery at the Fair of the American Institute, we expressed some doubt as to the practicability of adjusting the tube leading from the supply vessel in such a way as to regulate the force of the latter. The inventor personally assures us, however, that this difficulty does not exist, and that he has run a battery of this kind eighteen months without any change of parts or addition of material, the electromotive power being employed for driving a clock, and acting continuously and uniformly throughout that period.

An Enterprising Photographer.

An ingenious photographer has lately come to grief in Paris in this wise: Business being slack—personal vanity not having revived sufficiently, since the Commune, to call for his aid and the sun's—he looked up his collection of negatives, and, selecting those of the least well favored of his lady clients, he took off impressions of the same, and sold them as portraits of the *pétroleuses*, or women arrested for firing houses with petroleum. A collector of these curiosities was astonished one day to find the counterfeit presentment of his respected mother-in law among those of these fair incendiaries. Some men might not have found fault with this disposition of that particular relative, which seems to be the *bête noire* of English and French husbands. This son-in-law, however, did not belong to that category; and forthwith looked up the offender, and had him arrested and punished. In mitigation of sentence, he pleaded that he was by no means the only sinner of his class, the same industry being profitably pursued by others of his profession.

Elasticity of Wood.

The following are some of the results of the recent experiments of Messrs. Chevandier and Wertheim on the resistance of wood. These experimenters have drawn the following principal conclusions:

The density of wood appears to vary very little with age.

The coefficient of elasticity diminishes, on the contrary, beyond a certain age; it depends, likewise, upon the dryness and the exposure of the soil, in which the trees have grown, to the sun; thus the trees grown in the northern, north eastern and north western exposures, and in dry soils, have always so much the higher coefficient as these two conditions are united; whereas the trees grown in muddy soils present lower coefficients.

Age and exposure influence cohesion.

The coefficient of elasticity is affected by the soil in which the tree grows.

Trees cut in full sap, and those cut before the sap, have not presented any sensible differences in relation to elasticity.

The thickness of the woody layers of the wood appear to have some influence on the value of the coefficient of elasticity only for fir, which is greater as the layers were thinner.

In wood there is not, properly speaking, any limit of elasticity for the woods experimented upon by Messrs. Chevandier and Wertheim; but in order to make the results of their experiments agree with those of their predecessors, the authors have given, for the value of the limit of elasticity, the load under which it produces only a very small permanent elongation.—*Treatise on the Resistance of Materials.*

DO NOT be above your business, no matter what that calling may be, but strive to be the best in that line. He who turns up his nose at his work quarrels with his bread and butter. He is a poor smith who quarrels with his own sparks; there is no shame about any honest calling; don't be afraid of soiling your hands; there is plenty of soap to be had. All trades are good to traders. Above all things avoid laziness. There is plenty to do in this world for every pair of hands placed upon it, and we must so work that the world will be richer because of our having lived in it.

WHO IS OLD?—A wise man will never rust out. As long as he can move and breathe he will be doing for himself, his neighbor, or for posterity. Who is old? Not the man of energy, not the day laborer in science, art or benevolence; but he only who suffers his energies to waste away, and the springs of life to become motionless; on whose hands the hours drag heavily, and to whom all things wear the garb of gloom.

YOU may find your best friend or your worst enemy in yourself.

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FOSTER'S THILL COUPLING.

Our engravings illustrate a new thill coupling, which is free from rattle, is stout and durable, neat in appearance, and enables the thills to be coupled or uncoupled with the greatest facility.

Fig. 1 is a perspective view, Fig. 2 a detail, and Fig. 3 a section, showing a tubular rubber compression spring, by which the coupling is rendered noiseless.

A, Figs. 1, 2, and 3, is the strap of the coupling, which is attached to the axle by means of a clip, B, as shown in Fig. 1.

Fig. 1

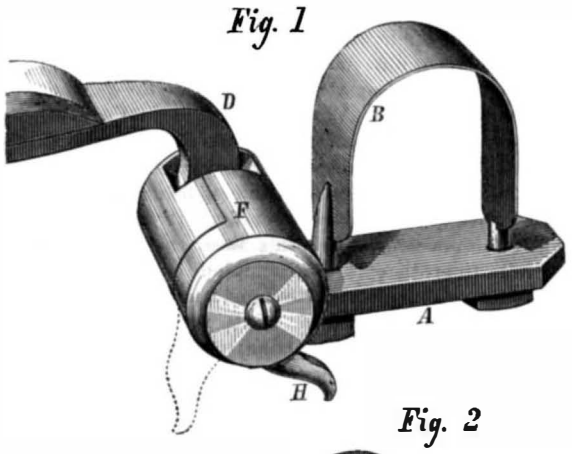


Fig. 2

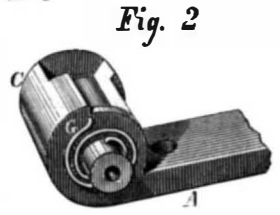
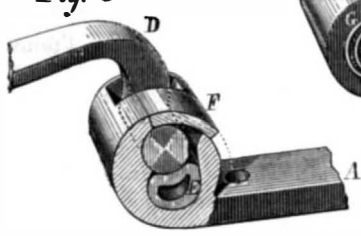


Fig. 3



On the front end of A is formed the body of this part of the coupling, of the form shown at C, Fig. 2. This body is a hollow cylinder, slotted in the upper side, as shown, to admit the thill iron, D, Figs. 1 and 3.

The part of the thill iron which enters the hollow of the cylinder, C, is bent at right angles to the shank, and is itself cylindrical in form, as shown in dotted outline in Fig. 3.

The outline of the hollow, in C, is not a circle, but is of the shape shown in the section, Fig. 3, nearly that which would be produced by the intersection of two cylinders. In the lower portion of this cavity is placed a piece of rubber tubing, E, Fig. 3.

Pivoted to C is the cap, F, which, by means of a coiled spring, G, Fig. 2, is made to cover the cylindrical end of the thill iron, as shown in Figs. 1 and 3. A thumb piece, H, enables this to be turned back to permit the insertion of the thill iron; and, when it is released, it closes again, as shown in Figs. 1 and 3.

The whole seems admirably adapted to subserve the desired end, namely, a quickly adjusted, durable, and silent coupling.

Patented, August 29, 1871, by Wm. G. Foster, whom address, for further information, Dansville, N. Y.

VENTILATING GRAIN VESSEL AND GRAIN CAR.

The purpose of the first of these inventions is to improve upon the common construction of the hulls of grain vessels, so that the grain may be more thoroughly aerated and more perfectly preserved.

Perforated air conducting pipes are arranged along the bottom of the hold of the vessel from bow to stern, or throughout the length of the grain holding space, preferably one on each side of the keelson; but they may be arranged in any approved way. They have a connection at one end, with a funnel mouthed hood; or with any other suitable natural or artificial means, for causing the air to flow in through the pipes and escape through the perforations into the grain or other perishable cargo. The other end has an escape pipe provided with a stopper, to be opened or not, for permitting the air, or a part of it, to escape thereat, or for inspection of the pipes, or to note the action of the air. Another system of perforated pipes is arranged under the deck and connected with the hood or other supply source, and is also provided with a discharge, at the end opposite where the air is received.

The hood is arranged on a pivot to turn to the wind, and the discharge may have a hood arranged to cause a vacuum and produce suction, to accelerate the currents. In this case covering plates are used for the lower tubes, to be swung over the pipes upon the top of the keelson to protect them when other freight, which might injure them, is being carried instead of grain, as on return passages. The air introduced through the pipes, rising up through the cargo to cool it, is delivered through openings in the deck, or is taken up by the system of pipes under the deck, and conveyed away by them; or these pipes may be used alone in some cases where the grain is comparatively dry, and the air, acting on the surface only, will be sufficient to preserve the grain.

By this, or an equivalent apparatus, a current of air may be kept constantly flowing through the bulk of grain or other perishable cargo while in the vessel, maintaining a low temperature, and conveying away the vapors generated by the tendency of all such substances, when confined in large bodies, to fermentation, and the grain or other substance will not only be preserved from damage by fermentation, but will be improved in condition at the same time. This mode of applying the atmospheric air and removing the confined air is also beneficial in a high degree to vessels carrying other freight for preserving the vessel and maintaining a healthful condition in the hold.

The inventor claims any other analogous arrangement of air pipes that may be used with like results.

He has also made an application of the same principle to grain cars, and those used for the transportation of fruit and vegetables, which will greatly aid in the proper transportation of such articles in good condition.

At the present time the great quantity of grain, shipped from the interior of the country to the seaboard and across seas, is carried in bulk in close cars, or in boats or vessels, and is almost always injured more or less by the exclusion of air, which is so necessary for its preservation. Owing to the vast quantities shipped, the bulkiness of the article, expense of storing room, and facilities for drying, cleaning, and preserving the grain, and also owing to the limited means of shipment and the haste with which it is necessary, for various reasons, to get the grain to market, it is much neglected in respect of its condition as to dryness after once having been started on the way to market; and vast quantities are shipped in a damp condition, in consequence of which, when arrived in the market, a large proportion has greatly depreciated in quality and value, so that, besides the actual loss in money value which falls ultimately mainly on the producer, the consumer is subjected to the necessity of using inferior or injured food. The inventor of the system of ventilation described claims not only to obviate these evils, but to cause the grain and other articles to be actually improved while in transit, and that, too, by taking advantage of the natural facilities offered by the moving vessel or car, without additional expense, except, perhaps, an unimportant trifle in the first cost of cars, and also without additional attendance.

These inventions have been patented, through the SCIENTIFIC AMERICAN AGENCY, by William S. Sampson, of New York city, assignor to himself, Ruth Ann Van Bunschoten, and Harriet Van Bunschoten, of same place.

IMPROVED POCKET OILER.

The improved pocket oiler, shown in the accompanyin gengraving, is a very neat and handy implement, for use in connection with sewing machines and other small machinery, and as neat in use as it is in appearance.

The body of the oiler is flat, rounded off at the edge, and the nozzle is provided with a small neat screw cap, which effectually prevents any efflux of oil, when not in use.

The engraving so fully illustrates the device that no further description is needed. It was patented July 20, 1869, through the Scientific American Patent Agency. Further information may be obtained from Charles Goodenough, 41 Dey street, New York city.

Clogston's Gate for Marble Saw Gang.

A new way of coupling together the sides and cross pieces of a gang saw gate, by means of an intermediate coupling piece, fast to the cross bars sliding loosely in the tubular sides, has been invented by Lucius B. Clogston, of West Rutland, Vermont.

Tubular and channeled iron have been heretofore used to combine lightness and strength, and are well known to the public; but Mr. Clogston combines with them a third instrumentality which enables the two to embody a new principle or mode of operation.

The cross bars of the gate are preferably formed of channel iron; and the side pieces are preferably made tubular throughout their whole length. Coupling plugs, riveted to the cross bars, play loosely in the ends of the tubes.

A series of saws is placed between and parallel to the side pieces at a suitable distance apart and strained to any desired tension while cold. As they are used, the heat of friction causes them to expand and become elongated.

If the cross bars are rigidly fastened at a fixed distance apart, one of two things must occur; they must be either strained very loosely at first, so as not to work well, and remain so until they reach some indefinite temperature and expansion; or they must be strained tight enough to work well in the first instance and successively keyed up, as they work loose by expansion, according to the judgment of the operator, until the requisite tension is obtained. Neither of these gives the desired accuracy or desired economy of labor. By making the coupling plugs self adjustable in the side tubes, they can be strained to the proper degree of tension in the beginning and thus be made automatically to adjust themselves to the elongation of the saws by expansion.

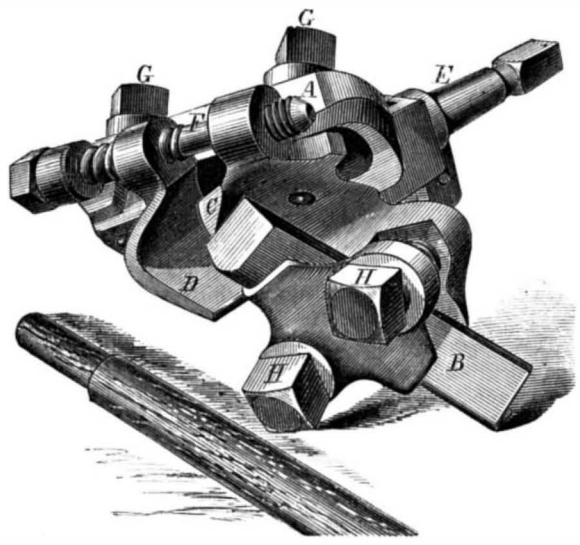
HE who has struck his colors to the power of an evil habit, has surrendered himself to the power of an enemy bound by no articles of faith, and from whom he can expect only the vilest treatment.

SMITH'S IMPROVED HOLLOW AUGER.

The tool illustrated in the accompanying engraving has the merit of being very cheaply constructed, while it is, at the same time, adjustable for various diameters and lengths of tenons (for spokes, etc.), the one tool thus taking the place of several which are required in the performance of certain kinds of work.

Referring to the engraving, A is the part which supports the working parts of the device, namely, the cutter bit, B, its clamping plates, the jaw, C, the jaw, D, and adjustable shank shaft, E, the right and left threaded screw, F, and the set screws, G and H.

The point of the spoke to be tenoned is inserted between the jaws, C and D. The instrument then being turned by the aid of a bitstock, the tenoning proceeds until the inner end of the shank, E, meets the end of the spoke, thus gaging the length of the tenon.



By loosening a set screw (not shown), the shank may be adjusted so as to make longer or shorter tenons, as desired. The set screw referred to does not, however, hold the shank from turning in its socket, this being accomplished by a groove and feather. The set screw merely presents the longitudinal movement of the shank.

The jaws, C D, are adjustable, for the diameter of the tenon, by the right and left threaded screw, F, which moves them, simultaneously and equally, to or from the central axis of the tool. They move in slots formed in the part, A, and are held when adjusted by the set screws, G.

The jaw, C, carries the cutter bit, which has an L shaped edge, and is held by a clamping plate and the set screws, H.

The principal parts of the tool, except the bit shank and screws, are of malleable cast iron, and the implement can be manufactured at small cost, and sold cheaply.

It was patented July 17, 1866, through the Scientific American Patent Agency, by J. Heston Smith, whom address at Lambertville, N. J.

Schindler's Photographic Posing Chairs.

Mr. Charles A. Schindler, of West Hoboken, New Jersey has designed an improved chair for photographers' use in posing their subjects, which he has just patented. The back of the chair has the lower parts of the side bars slotted to receive a flange formed upon the rear ends of arms, the forward ends of which are attached to the rear parts of the sides of the seat frame. The outer sides of the side bars of the back are covered by plates, which cover the rear ends of the arms and the slots. The lower ends of the slotted parts of the side bars of the back are connected and held in their proper relative position by two parallel cross bars. A hand screw, is passed through and swivelled to the outer of these cross bars, and screws into the inner cross bar, so that, by turning the screw in one direction, the parts of the side bars of the back will be made to clamp the flanges of the arms, which extend back from the seat, and thus secure the back at any desired elevation.

The rear legs of the chair are so arranged and formed that the lower ends of the side bars of the back may descend along and fit upon the rear sides of the legs, to support the lower end of the back, however it may be adjusted. As heretofore made the rear legs these chairs have projected laterally and rearwardly, and the lower end of the back has descended between them, the lower end when lowered being entirely unsupported.

The arms of the chair are each made with and supported by a single standard, the lower end of which is inserted in a keeper, attached to the side of the seat frame. This construction allows one or both the arms to be detached when desired.

THE DARIEN SHIP CANAL.—Some particulars of Commander Selfridge's exploration of the Isthmus of Panama have been communicated to the public, although the report has not yet been published. Tho route recommended is along the course of the river Atrato, and thence to Cupica Bay, on the Pacific Ocean, The work is calculated to cost over $100,000,000, the obstacles to rapid engineering progress being formidable. One of these difficulties is the construction of a tunnel, four miles in length, seventy feet wide, and *one hundred and seventy high.* The account does not tell us the nature of the soil through which this excavation is to be made. The canal will require twenty-two locks, nine rising from the Atlantic coast to the highest point, and thirteen descending thence to the Pacific.

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PSYCHIC FORCE.---FURTHER EXPERIMENTS BY DR. CROOKES.---REPLY TO HIS OPPONENTS.

"I am attacked by two opposite sects—the scientists and the know-nothngs. Both laugh at me, calling me the 'frog's dancing master.' Yet I know that I have discovered one of the greatest forces in nature."

With these pithy words of Galvani, extorted by the ridicule to which that great discoverer was subjected on the announcement of the wonderful discovery of the movements of dead frogs' legs, caused by the contact of metals with the lumbar nerves, and which was the origin of that department of electric science called, in honor of its discoverer, galvanism, Dr. Crookes, in the last number of the *Quarterly Journal of Science*, commences an elaborate article to sustain the authenticity of his alleged discovery of "psychic force," and an account of further experiments which he puts forth as removing all the objections raised against his previous experiments, which were published in a former issue of the same periodical, and reproduced with engravings in the SCIENTIFIC AMERICAN of August 12, 1871.

We do not propose in this article to repeat the replies of Dr. Crookes to certain, in his opinion, captious objectors. He very properly declines to notice any who question his veracity. To some of those who, on other grounds, have taken exceptions to the conclusiveness of his experiments, he replies in a very spirited manner, and in several cases proves these objectors to be themselves in fault.

Thus, to Mr. Coleman Sellers' singular objection, based upon his assumed weight of the mahogany board, calculated from its size and the specific gravity of mahogany as given in tables, he replies that the board in question weighs only six pounds, instead of thirteen and one half pounds, as calculated by Mr. Sellers. Dr. Crookes says: "Four separate balances in my own house tell me so, and my greengrocer confirms the fact."

To Professor Stokes' objection, based upon a geometrical demonstration of the power that might be gained in a peculiar way of applying the pressure of the hands to the apparatus described in our former article, Dr. Crookes replies by a similar demonstration, showing that in the application of the pressure, as described by Professor Stokes, Mr. Home would have been obliged to exert a pressure of seventy-four and one half pounds, with the tips of his fingers, to have produced the result stated, which exertion he regards as simply impossible under the circumstances.

Professor Balfour Stewart, who thought Dr. Crookes might have been electro-biologized by Mr. Home, will hardly say the recording instruments were biologized, and he is referred to the curves traced by these instruments as proof of actual motion in the apparatus.

Dr. Crookes also applies some verbal caustic to the tender skin of Professor Stokes, relative to the refusal of the latter gentleman to witness the experiments for himself, when he not only had ample opportunity, but was earnestly urged to do so; but we will not go into these personal matters. We prefer to introduce the experiments at once to our readers, reserving such comments as we may see fit to make for our editorial colums. In describing these experiments, we shall only in part quote *verbatim* from Dr. Crookes' paper, condensing such portions as will not weaken the force of the points he makes, in order to accommodate the discussion to our limited space.

He says:

On trying these experiments for the first time, I thought that actual contact between Mr. Home's hands and the suspended body, whose weight was to be altered, was essential to the exhibition of the force; but I found afterwards that this was not a necessary condition, and I therefore arranged my apparatus in the following manner, illustrated in the engravings:

A B is a mahogany board, thirty-six inches long by nine and a half inches wide and one inch thick. It is suspended at the end, B, by a spring balance, C, furnished with an automatic register, D. The balance is suspended from a very firm tripod support, E. To the moving index, O, of the spring balance, a fine steel point is soldered, projecting horizontally outwards. In front of the balance, and firmly fastened to it, is a grooved frame carrying a flat box, similar to the dark box of a photographic camera. This box is made to travel by clockwork horizontally in front of the moving index, and it contains a sheet of plate glass which has been smoked over a flame. The projecting steel point impresses a mark on the smoked surface. If the balance is at rest, and the clock is set going, the result is a perfectly straight horizontal line. If the clock is stopped, and weights are placed on the end, B, of the board, the result is a vertical line, whose length depends on the weight applied. If, while the clock draws the plate along, the weight of the board (or the tension on the balance) varies, the result is a curved line, from which the tension in grains, at any moment during the continuance of the experiments, can be calculated.

The instrument was capable of registering a diminution of the force of gravitation as well as an increase; registrations of such a diminution were frequently obtained. To avoid complication, however, I will only here refer to results in which an increase of gravitation was experienced.

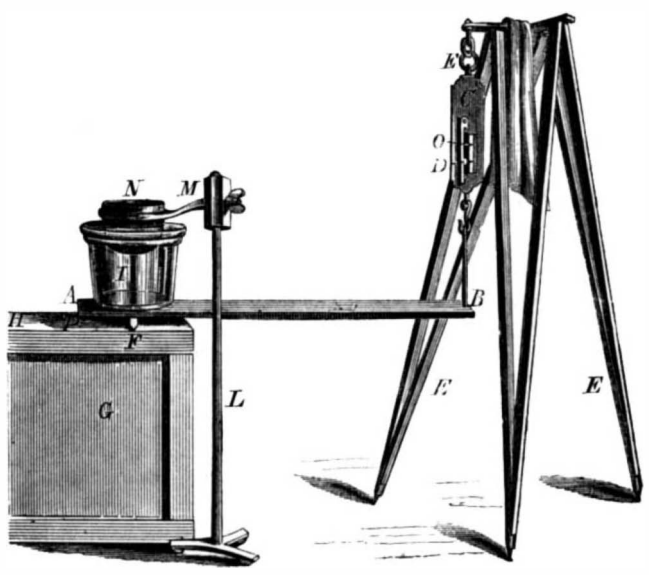
The end, B, of the board being supported by the spring balance, the end, A, is supported on a wooden strip, F, screwed across its lower side, and cut to a knife edge. This fulcrum rests on a firm and heavy wooden stand, G H. On the board, exactly over the fulcrum, is placed a large glass vessel with water, I. L is a massive iron stand, furnished with an arm and a ring, M N, in which rests a hemispherical copper vessel, perforated with several holes at the bottom.

The iron stand is two inches from the board, A B, and the arm and copper vessel, M N, are so adjusted that the latter dips into the water one and a half inches, being five and a half inches from the bottom of I, and two inches from its circumference. Shaking or striking the arm, M, or the vessel, N, produces no appreciable mechanical effect on the board, A B, capable of affecting the balance. Dipping the hand to the fullest extent into the water in N does not produce the least appreciable action on the balance.

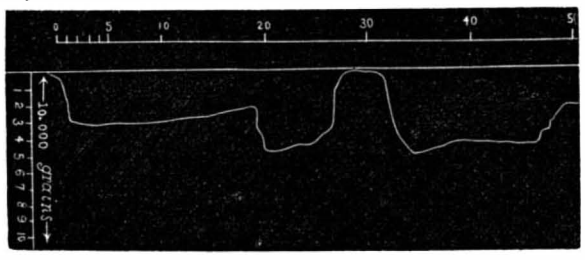
As the mechanical transmission of power is by this means entirely cut off between the copper vessel and the board, A B, the power of muscular control is thereby completely eliminated.

For convenience, I will divide the experiments into groups 1, 2, 3, etc., and I have selected one special instance in each to describe in detail. Nothing, however, is mentioned that has not been repeated more than once, and in some cases verified, in Mr. Home's absence, with another person possessing similar powers.

There was always ample light in the room where the experiments were conducted (my own dining room) to see all that took place.



Experiment 1. The apparatus having been properly adjusted before Mr. Home entered the room, he was brought in, and asked to place his fingers in the water in the copper vessel, N. He stood up and dipped the tips of the fingers of his right hand in the water, his other hand and his feet being held. When he said he felt a power, force, or influence proceeding from his and, I set the clock going, and almost immediately the end, B, of the board was seen to descend slowly and remain down for about ten seconds; it then descended a little further, and afterwards rose to its normal hight. It then descended again, rose suddenly, gradually sunk for seventeen seconds, and finally rose to its normal hight, where it remained until the experiment was concluded. The lowest point marked on the glass was equivalent to a direct pull of about 5,000 grains. The accompanying figure (2) is a copy of the curve traced on the glass. The horizontal scale of seconds shows the time occupied in the movements, the experiment lasting one minute. The vertical scale shows the tension in grains exerted on the balance at any moment.



Experiment 2. Contact through water having proved to be as effectual as actual mechanical contact, I wished to see if the power or force could affect the weight, either through other portions of the apparatus or through the air. The glass vessel and iron stand, etc., were therefore removed as an unnecessary complication, and Mr. Home's hands were placed on the stand of the apparatus at P. A gentleman present put his hand on Mr. Home's hands, and his foot on both Mr. Home's feet, and I also watched him closely all the time. At the proper moment the clock was again set going; the board descended and rose in an irregular manner, the result being a curved tracing on the glass (of which a copy is given, but which we do not reproduce).

Experiment 3. Mr. Home was now placed one foot from the board, A B, on one side of it. His hands and feet were firmly grasped by a bystander, and another tracing was taken on the moving glass plate, indicating abrupt deflections, more or less sustained.

Experiment 4—(tried on an occasion when the power was stronger than on the previous occasions). Mr. Home was now placed three feet from the apparatus, his hands and feet being tightly held. The clock was set going, when he gave the word, and the end, B, of the board soon descended, and again rose in an irregular manner, making a peculiar and striking diagram on the moving glass plate.

A series of experiments were also performed with the following apparatus: A light lever was delicately balanced. At one end it carried a vertical needle point touching a parchment disk stretched on a hoop, much like the ordinary tambourine. At the other end of the lever, which was the end of the long arm, a tracing point marked upon smoked glass moved by clock work. When the hand of a medium was brought over the parchment, at a little distance from the lever, the latter was so agitated as not only to make distinct taps on the parchment, but to form, at the same time, curves on the glass at the opposite end of the lever. In one case the medium was a lady, a non-professional, who had no knowledge of the apparatus previous to being ushered into its presence. The experiments indicate nothing beyond what was shown in those which preceded them. They were, however considered more delicate. In a letter to Professor Stokes, published in another part of the paper, Dr. Crookes states that, with a mirror and a reflected ray of light, will show deflections, due to fractions of grains of pressure. With this apparatus, he thinks he will be able to prove that all persons possess the psychic force in some perceptible degree.

These experiments, says Dr. Crookes, *confirm beyond doubt* the conclusions at which I arrived in my former paper, namely, the existence of a force associated, in some manner not yet explained, with the human organization, by which force increased weight is capable of being imparted to solid bodies without physical contact. In the case of Mr. Home, the development of this force varies enormously, not only from week to week, but from hour to hour; on some occasions the force is inappreciable by my tests for an hour or more, and then suddenly reappears in great strength. It is capable of acting at a distance from Mr. Home (not unfrequently as far as two or three feet), but is always strongest close to him.

Being firmly convinced that there could be no manifestation of one form of force without the corresponding expenditure of some other form of force, I for a long time searched in vain for evidence of any force or power being used up in the production of these results.

Now, however, having seen more of Mr. Home, I think I perceive what this psychic force uses up for its development. In employing the terms *vital force*, or *nervous energy*, I am aware that I am employing words which convey very different significations to many investigators, but after witnessing the painful state of nervous and bodily prostration in which some of these experiments have left Mr. Home—after seeing him lying in an almost fainting condition on the floor, pale and speechless—I could scarcely doubt that the evolution of psychic force is accompanied by a corresponding drain on vital force.

I have ventured to give this new force the name of *Psychic Force*, because of its manifest relationship to certain psychological conditions, and because I was most desirous to avoid the foregone conclusions implied in the title under which it has hitherto been claimed as belonging to a province beyond the range of experiment and argument. But having found that it is within the province of *purely scientific research*, it is entitled to be known by a scientific name, and I do not think a more appropriate one could have been selected.

To witness exhibitions of this force, it is not necessary to have access to known psychics. The force itself is probably possessed by all human beings, although the individuals endowed with an extraordinary amount of it are doubtless few. Within the last six months I have met, in private families, five or six persons possessing a sufficiently vigorous development to make me feel confident that similar results might be produced through their means to those here recorded, provided the experimentalist worked with more delicate apparatus, capable of indicating a fraction of a grain instead of recording pounds and ounces only.

As far as my other occupations will permit, I propose to continue the experiments in various forms, and I will report, from time to time, their results. In the meanwhile, I trust that others will be induced to pursue the investigation in its scientific form. It should, however, be understood that, equally with all other scientific experiments, these researches must be conducted in strict compliance with the conditions under which the force is developed. As it is an indispensable condition of experiments with frictional electricity that the atmosphere should be free from excess of moisture, and that no conducting medium should touch the instrument while the force is being generated, so certain conditions are found to be essential to the production and operation of the psychic force, and unless these precautions be observed, the experiments will fail. I am emphatic on this point, because unreasonable objections have sometimes been made, to the psychic force, that it is not developed under adverse conditions (dictated by the experimentalist,) who, nevertheless, objects to conditions being imposed on himself in the exhibition of any of his own scientific results. But I may add, that the conditions required are very few, very reasonable, and in no way obstruct the most perfect observation and the application of the most rigid and accurate tests.

TO VIOLIN PLAYERS.—Mr. J. R. Little, of Monmouth, Ill., writes to say that his suggested use of chalk, by performers troubled with perspiration on the hands, was misunderstood by us. He states that "slipping of the fingers is in some instances an absolute necessity, and anything interfering with that motion is objectionable." We do not understand that the *sliding* of the stop fingers should be prevented, nor would our readers gather such an opinion from the paragraph. We alluded only to the difficulty some players find in keeping a steady stop on the strings when the hands are perspiring; and to prevent the fingers from slipping involuntarily, the use of chalk was recommended.

THERE is nothing like beginning life with settled economical principles. Extravagance is a habit easily contracted, and goes on increasing in volume as a snowball does when rolling down hill.

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Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

The Psychic Force.

To the Editor of the Scientific American:

The reply of B. D., of Jersey City, to my communication (page 243), is the best proof I could possibly desire of the truth of my statement, that there exists, among people, a "universal predilection for believing what is liked best, without investigating what is strictly true, and a general disgust of being told that they err in judgment."

I further said: "When you tell them that they err in judging about the so called spiritual manifestations (and I ought to have added, the so called psychic force theory), and that they are totally mistaken in ascribing them to the mysterious agencies, the belief which they so dearly cherish, you will find that there are very few who will ever forgive you."

That B. D. is not one of the few, is evident from his temper, displayed in using, in my regard, the words, "false position," "foolish," "unscientific," "credulous faith," etc. I wish he had followed my example, and abstained from personal imputations, and above all from offensive adjectives, which prove nothing, and only reflect on him who uses them. He commences with the gross misstatement that I "plead guilty of entire ignorance of the experiments which were made by Professor Crookes and his two colaborers," and that I "admit that I cannot explain them."

First misstatement: Mr. Crookes has given a detailed account of the experiments, and illustrated them with elaborate figures, in order to give his readers a full knowledge of them, and of the reasons which induced him to accept the hypothesis of what he calls a new force, "Psychic." Every one who has read, as carefully as I have done, this description, cannot be said to be entirely ignorant of the experiments, and I surely did not "plead guilty of this ignorance."

Second misstatement: The experiments were not made at all by Professor Crookes, nor by his colaborers, but by D. D. Home, an acknowledged English spiritualistic medium. Mr. Crookes only says that he prepared some of the apparatus, but this is not experimenting. If Mr. Crookes had himself done the whole thing, in place of Home, only then would B. D. be right in speaking of "the experiments by Professor Crookes, and his two colaborers." According to Crookes' own account, he was, with his two friends only a witness to Home's performance.

Third misstatement: That "I admit that I cannot explain them." Now I think that B. D. places himself here in a false position, when it is considered that I have distinctly stated that I have made similar experiments, and have seen some apparently much more mysterious and wonderful, all of which were only claimed to be produced by the ordinary means, or so called jugglery; therefore, I say that, in order to explain what Mr. Crookes has seen, it is not at all necessary to invent a new force. As the very same things are done by jugglery, Home must, in order to satisfy people of common sense, perform more dignified feats, in which there can be no jugglery whatever, in place of the childish tricks described by Crookes; and to do this he signally fails.

All what I admitted was, that in order to find out what the special trick of the juggler is, in any similar performance, it is necessary to be present; this is for the simple reason that the resources of physical science are almost infinite. Expert jugglers often perform the same trick by different means, in order to mislead, most thoroughly, such spectators as are at the point of divining the truth. Every trick, therefore, has its own explanations, which vary with the manner in which it is performed.

In the second paragraph, B. D. informs me that Professor Crookes is the editor of the *Quarterly Journal of Science*, published in London. This looks as if all that B. D. knows of Professor Crookes is from the account of these experiments taken from that journal by the SCIENTIFIC AMERICAN. The editorship of the *Quarterly Journal of Science*, since January, 1871, is only one of the minor merits of this eminent chemist. Let me tell B. D. that I am better acquainted with Mr. Crookes' labors than he appears to be. Professor Crookes is also editor of the *Chemical News*, one of the best scientific weeklies, also published in London; he is the celebrated discoverer of the new metal thallium; he has also made many other very important discoveries, and published most valuable contributions to science. Therefore I have been for many years his constant admirer, and was greatly mortified to see the appearance of such a weakness in his mind, as to be at the point of becoming a believer in the psychic force theory. It was with the same feeling of mortification that I met, in the year 1853, the great American investigator, Professor Hare, of Philadelphia, whose discoveries and experiments in electricity I had, twenty years before, carefully studied while in Europe, where I had his experiments repeated; this great man, in the latter part of his life, when his mind became weak, turned a confirmed spiritualist.

B. D. will not allow this, I suppose, as an argument in favor of spiritualism; well, even so I object to consider the weakness of mind of Professor Crookes as an argument in favor of the "Psychic force theory."

In the third paragraph B. D. thinks he finds proof of my "want of knowledge of the position of this matter . . . by the strange way in which I mingle the psychic force theory and spiritualism together." This may appear so to him, who believes in the one and not in the other, as is proved by his expression that I may apply my "reprobation to spiritualism, and few people will object." He proves here his own "want of knowledge of the position of this matter," because spiritualists claim that there are more than a million spiritualists in the United States alone, while I can introduce him in more than one flourishing spiritual society, in New York city. Let me assure B. D., that, years ago, I studied the so called psychological phenomena, and that if I should describe what I have witnessed, I could fill Professor Crookes' whole *Quarterly Journal of Science*, and his *Chemical News* besides, with the illustrated accounts, among which increased pressure on levers, without apparent contact, table tipping, table moving, piano playing by invisible players, floating guitars and accordions, etc., etc. All this is exclusive of the strictly spiritual circles in which I have assisted, and where only communications were assumed to be received from departed souls, by the intervention of so called mediums, one of which Mr. Home claims to be.

Now I deny, with B. D., this claim of Home, and assert, with him, that such a claim is an imposition. Then I go a step further, and assert that the claim of possessing a peculiar force (psychic, or whatever name, is indifferent) is also an imposition. Mr. Crookes and B. D., allow this claim, but when they find the errors of their ways, I do not doubt but they will be candid enough to confess that they were deceived by an ingenious application of the positive physical sciences.

These sciences, especially that branch of them constituting modern biology, answer the main point, which B. D. says, in his fourth paragraph, that I have not considered, namely, the question: "Is it not possible that power can emanate from a man's will or mind, over and above the mere dynamical force of his muscles?" This question is the usual argument of the defenders of such deceivers as Home. It is repeated, in other words, by a second correspondent (page 276); it simply proceeds from the ancient misconception that force is something immaterial, separable from matter, that it has its origin purely in the will of the mind, and that therefore it may be possible that the will, or spirit, alone can move extraneous matter, as well as it appears to move any member of our bodies. The doctrine of the conservation and transmutation of forces, in combination with the clearer ideas taught by modern physiology, has exploded the idea that there is a new unexplored field in this direction. But as this communication is already too long, I am obliged to devote, to the consideration of this important question, a separate article.

In the closing sentence, B. D. makes a very unjust, unfair, and unmerited accusation against me, namely, that I should have "a most credulous faith in the inventive genius of a charlatan." After what I have seen of so called jugglers, and considering what I am able to do myself in this line, there is no credulity, and even no faith about it; it is all positive knowledge. I know what can be accomplished, especially before spectators like B. D., who, when witnessing such experiments, are prejudiced by a foregone conclusion, about the existence of a so called psychic force, and, in this way, obscure entirely the little amount of acuteness in perception their senses may perhaps otherwise possess.

In conclusion I appeal to the future, confidently expecting that, at an early day, we will see published by an expert in this line, who has opportunity to do it, a full exposure of the "inventive genius of the charlatan," David D. Home, pretended spiritualist, medium, psychologist, etc.

P. H. VANDER WEYDE, M.D.

New York city.

Treatment of Gold Ores.

To the Editor of the Scientific American:

The numerous discussions, in recent numbers of your valuable paper, on the imperfect manner in which quicksilver amalgamation performs the gold extraction of Colorado ores (and, for that matter, of California and other gold ores in general), and the desire to discover means, by which the amalgamation may be improved, are but another illustration of the observation, frequently noticed in your pages of late, that the human mind is apt to follow a well worn track, from which few only deviate. Amalgamation and concentration of the ores has been practiced with gold ores for centuries, and it is erroneously taken for granted that these two modes should form the basis of operations, which ingenuity is taxed to improve. It has been shown that amalgamation, by the indifferent affinity of quicksilver to gold, secures on an average, only a little over, if at all, one half of the gold contained in the ore. It is also proved that in the process of concentration the fine particles of gold, flattened out exceedingly thin in the act of crushing the ores, are carried off in a large proportion as float gold by the stream of water used in concentration, as well as in battery amalgamation, and in a proportion sometimes approaching nearly that secured by amalgamation; for a float loss of $10 to $15 per tun in ores yielding but $16 to $25 per tun is by no means rare. This demonstrates, as it has done many years ago to this writer, a California gold miner of 1849, that we have to look for other means to avoid these losses.

Of all substances known, zinc, in a melted state, has the greatest affinity for gold (and silver); instant contact suffices to dissolve even heavy particles of gold by forming an alloy. Zinc does not combine directly with sulphur, but gold particles, covered with gold sulphuret and inert to the action of quicksilver, yield instantly to the zinc, as anybody can easily convince himself. The ore pulverized dry, and the dry (or dried) ore or tailings passed gradually through a bath of melted zinc, yields up, on an average, 80 to 90 per cent of its auriferous contents, without loss of any float gold. All the *débris*, even the iron sulphurets of the ore, is specifically lighter than the zinc; and the ore, introduced at the bottom of a deep and narrow trough of melted zinc, rises to the surface to be removed, leaving in its passage the gold behind as an alloy, which can be tested at any time, and the amount of gold in it determined with accuracy. When sufficiently rich, the precious metals are separated from the zinc by retorting, or the known modes of dissolving the zinc by acids. No water is required in the zinc process above explained, except for the use of the engine, to reduce the ores, and that much is found even in the barren Colorado desert without difficulty. This point is well worthy of consideration, for nine out of ten rich gold mines are now lying idle, entirely or part of the time, for want of water required for the usual battery amalgamation works, while the sagebrush and mesquite of the desert yields ample fuel to raise steam and to keep the zinc up to the required temperature—just above the melting point; and the value of the float gold saved is alone sufficient to cover the whole cost of extraction by zinc.

New York city. R. D'HEUREUSE.

Fireproof Safes.

To the Editor of the Scientific American:

The great fire in New York, in 1835, demonstrated that perfect immunity from fire for records and valuables was to be attained only beneath the surface of the ground. Firms, which in that disaster had their books and papers in vaults, came out from it actually richer than before, the increased value of the soil more than compensating for the loss sustained. Soon after this an ingenious friend of mine constructed a very simple iron safe, suspended by an ordinary rope and counterbalanced as window sashes usually are. This hung over a shaft descending below the floor of the cellar, and, with its door constructed to close always of itself, remained, throughout the time wanted for use, easily accessible. Should a fire occur by day, the rope would burn before the contents could be injured, and the box drop to its vault below. To raise and lower it morning and evening would be a very slight task, if it were properly balanced. The safe was guided by projections fitting in grooves, and on its top were three or more loose iron plates, each larger, by several inches around the margin, than the one below it. The top plate first engaged the projecting rim of the vault and closed it. The next, some four inches lower, rested on and closed another rim projecting upwards, and so on till the safe rested, leaving thus between each plate a space of several inches, with an iron bar passing through the holes in the plates to which the rope is attached. Whatever molten matter might run down, it could not reach beyond the first or second plate. This, I apprehend, is the only principle on which a perfectly fireproof safe can be constructed. As to burglars, what masonry and iron can effect is most easily brought into play in forming the case. In securing the safe then, vertical bars and locks are as easily and effectively applied as in any other form. Modification of these plates as permanent hinged lids on the box below, or otherwise, would perhaps be an improvement. J. J. W.

Philadelphia, Pa.

Indestructible Cities.

To the Editor of the Scientific American:

Can not we Americans invent a city that will not burn? These conflagrating Chicagos, combustible New Yorks and pyrotechnic Portlands are too trying for humanity to endure. Of course Chicago will arise, phœnix-like, from her ashes, and, of course, be consumed again, and with her the wealth and power that might make the earth an Eden, if properly spread over it. And why may not cities spread, while there is "all out doors" around them waiting to be beautified? Now that walled towns have passed away, and the need of crowding human beings into fortified cities for mutual protection from outside barbarians no longer exists—what wisdom, or even common sense, is there in adding house to house, thus making safety impossible, health a miracle, and happiness a myth? Why, with only our present imperfect means of transit, what multitudes of our citizens find their bed rooms from twenty to forty miles from their counting rooms! If our business men can do this, why may not their business follow suit? Could not cotton be sold on the north side of Harlem river, as well as on the south? Were Stewart to build a new "iron dry goods box" next square to his Fifth Avenue palace, would not the fashionable world follow? And if that wily Irishman has had the foresight to insulate his block by a street on every side, why may not poorer men do the same or better? If a Trinity church yard can be sandwiched into Broadway's most crowded part, thus avoiding the possibility of a fire spreading to or from it, why may not every business man have at least a few yards of green grass between him and destruction? That would be an oasis worth looking at, and an insurance that was sure. As things now are, city life is hardly worth the living. What we must insist on are beautiful, safe and wholesome places for human beings to pass their days in, to the end that, with wealth, health may be possible, and happiness not a mere mirage to be looked for only in or beyond the skies. Chicago has taught us two things: that a city can be built in a day, speaking figuratively, and be destroyed in a night, quite literally. Now let her take a "new departure" from ancient errors, and show the world how to create a city that will stand the test of both fire and time. To do this, let every block be insulated from every other; or, better yet, let no more than two business places be joined, and let there be as much space between every two as they both occupy. Let this open space be put down to grass or trees, or built in with green-houses, in which all sorts of exotic fruits could be made to grow. The side walls of the buildings, so coupled, could be pierced with all necessary windows for light and air, balconies (of iron) run along their many upper stories, and closed in with glass when desired. The roof should be entirely of glass set in iron sash, mansard style, thus converting what is usually a dreary dark garret into "a thing of beauty and a joy" to every one who enters its world of sunshine. Then let the upper

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"lofts," unused as they generally are for business purposes, be converted into suites of floors, as dwelling places for the thousands of working people, or those employed in the stores below, who are now crowded into wretched far-away dwellings or more wretched tenements. With steam "elevators," these airy homes could be reached in less time than one could cross a street! With blocks so constructed, not more than one need ever be burned at any one fire; and, perhaps, with water introduced in every story on the plan lately shown in the SCIENTIFIC AMERICAN (Hall and Brother's, I think) not even one need ever be entirely destroyed. And w th proper "fire escapes," easily provided from the many balconies, not a life need be lost.

But, "this will cost money," is objected. To which I reply: So does insurance (that may never be sure!) So do broken hopes (that can never be mended!) So do wrecked fortunes (that can never be restored!) So do all good things, health, happiness and security,—the crowning excellence of all. In this way, business and salubrity can go hand in hand to make city life what it should be. Our homes could then keep pace with our warehouses, and our comforts with our commerce.

Do you say that this is impossible? Then I say, with Ruskin, "It is indispensable!" J. IVES PEASE.

Stockbridge, Mass.

Testing Boilers Again.

To the Editor of the Scientific American:

In your issue of 21st instant, I find an article headed "Testing Boilers by Hydrostatic Pressure," signed Joseph A. Miller," in which he admits the possibility of testing boilers with a head of water greater than the pressure required. As he claims to feel thankful for the information I gave him on that subject in my letter of September 30.h, in reply to his inquiry of the 2d of same month, I will further state for his benefit that it has been done hundreds of times, and will again be done with less injurious results than when done by a pump (notwithstanding his doubts) for the simple reason that the pressure is a steadily increasing one, and easily regulated; whereas, in the other case, the shock or pulsation produced by each stroke of the pump is more severe, upon the same principle that boilers do not sustain the same injury when the engine is at rest as when in operation, cutting off at any given point with equal pressure. This is a well established fact with all practical engineers.

Mr. Miller, after admitting the possibility of such results, endeavors to make a little capital (or administer another kick to a party whom he considers to be going down hill) by accusing me of showing contempt for witnesses before coroners' inquests (using his own words), amongst whom are some of the best and truest men in the country. From practical positive knowledge I fully indorse his description of the character of most of the parties described as witnesses. But I am equally fully aware that there are others who embrace every opportunity offered to rush before juries for the sole purpose of perverting the truth, making statements at variance with facts, and advertising themselves and those who employ them, regardless of whom it may injure.

In this communication, I will s ate that I have no obj ction or dislike to any investigation of my conduct when made by honorable men who know of what they speak. Nor have I any fear of Mr. Miller's insinuations injuring me with gentlemen who know me, very many of whom are readers of your valuable paper.

He alludes to my size as being too large to enter manholes, and doubts my habit of wearing overalls. To show that he has no personal knowledge of what he says, I will state that I began to wear the one and enter the other in the year 1833, and have been in the habit of doing both to the present time; facts which may be proven. I am doubtful if his most intimate friends would accuse or credit him with such habits, judging from the knowledge he displays in the mode of testing boilers.

Then ensue other little kicks to the man supposed by him to be going down hill, in the shape of an appeal to humanity and the obligation of oaths, etc. In reply, I can only state that I as deeply regret the loss of life as any man living, and have as much veneration for an oath, and am also willing to be judged by a higher power than man.

He next proceeds to explain the non-elasticity of water and the tendency of containing vessels to assume the shape that will hold the most, also the strain on braces, etc. It seems to me that he was not writing for the edification of the intelligent readers of your paper.

Mr. Miller concludes his article by saying that unless I treat him as a gentleman, he will have nothing more to do with me. If a party, who will allow himself to take advantage of other's misfortunes, and make insinuations entirely devoid of truth, can flatter himself that he is a gentleman, I have yet to learn the true meaning of the term.

I am now done with Mr. Miller, unless his assertions should take a shape that would require notice in a different direction than a newspaper correspondence.

JOHN K. MATHEWS.

New York city.

COAL IN ALASKA.—We hear of the formation of a company for working some beds of coal recently discovered in Alaska. The report states that the coal is of good quality, both bituminous and anthracite. The deposits are found near the coast of the main land, and also on many of the islands. The company states that coal from Alaska can be sold in San Francisco for from $5·50 to $6·00 per tun. We hope it is so. The value of the discovery in such a locality as Alaska can hardly be overrated.

[For the Scientific American.]

ON MUSICAL TELEGRAPH COMPANIES.

BY P. H. VANDER WEYDE, M.D.

I have received a circular and prospectus of a "Musical Telegraph Company," formed recently in Rochester, N. Y., which proposes to connect a number of pianos, by means of electrical attachments, so that they may be all "controlled by one or more performers, or automatically by one or more musicometers." All the instruments are to be placed in one large hall, and "so arranged that notes reach the ear from different points, thus giving fullness and volume to the music;" while, finally, it is said, "It will afford the highest style of accompaniment to the human voice, in particular to that of the female."

The first step will be to construct electrical attachments for ten pianos, and to give, with these instruments, "the highest order of entertainments in different parts of the United States and other countries. The cost of these instruments will be about $20,000." Further, it is said: "Out of the proceeds of these proposed entertainments we will be able to construct, at a cost of half a million, our Grand Electro-musical Hall, which is the ultimate object of our efforts."

Being anxious to know more about this application of electromagnetism to musical performances (as I have given some attention to this subject myself), I ordered the lecture advertised by the president of the company, Mr. Hachenberg, to be sent by mail, but receiving information that it is not published yet, I am obliged to judge about the invention by the light so far received, and do this more readily as the main points are very distinctly stated.

I do not doubt that all cultivated musicians will agree with me that placing ten pianos around in a hall, and causing them to go mechanically all at the same time and in the same way, offers not the least advantage, and that a performance of this kind does by no means merit to be called a "musical entertainment of the highest order." For my part I infinitely prefer one single good grand piano with half a dozen or more or less other instruments, playing one of those classical compositions called quartets, quintets, septets, octets, etc., which the immortal masters have bequeathed to us. In such performances we have the advantage of the different character, color, or *timbre* (as the French call it), of the different instruments, the great charm of the individuality in the style of each separate performer, all of which brings out distinctly the connected thread of the separate melodies, often clashing together, as it were, but forming a whole with which the ear is delighted, and enabled to appreciate easily the multitude of melodies or *polyphony*, as it is technically called.

As the highest style of musical compositions are those of the class referred to, in which each performer executes melodious passages, different one from the other, the hearing a number of ten equal instruments all playing the same tune is, according to my taste, a most excruciating trial for any audience, and to call it "the highest style of accompaniment, in particular for the female," is indeed the highest style of absurdity. Still more so when it is stated that they also will be played automatically by "musicometers," which I understand to be mechanical contrivances containing the music stored up in them, as gasometers contain the provision of gas, the one letting off the music when turned on, the other the gas. Most likely the word is only a new name for a revolving drum, like that of a barrel organ.

Besides all this, experience has sufficiently proved that when two able performers play a classical composition for four hands on one good piano, everything is obtained which can be had out of this instrument, and that there is no advantage whatever gained in the effect by the addition of one or more other pianos. In regard to strength I say that one good grand piano is fully strong enough when four hands perform on it. What now must I think about the judgment in musical matters possessed by Mr. Hachenberg, when I read also in his programme: "One performer can play simultaneously two sets of instruments, the left hand controlling one set, and the right hand the other, and, in a duet, two players can play two sets of instruments." Any player can test the advantage of this proposition practically, by placing two pianos (upright ones are the best for this purpose) so close together at an angle that he can easily reach the two keyboards, and play on both at the same time; he finds then, musically illustrated, that two halves never make more than one whole. Connecting them electrically with different sets of instruments would make some difference in the effect, as the bass part may then be heard at one side of the room, and the treble part opposite, but this difference would not amount to much after all.

It may be interesting to trace the growth of the idea of applying the galvanic currents to keyed instruments; it was of course suggested by the fact that the House, Hudges, and a few other telegraphs use keyboards. The first description of such an instrument, we find in the London *Scientific Review* for 1866; it was noticed in the SCIENTIFIC AMERICAN for April 28, 1866, page 285. An organ worked on this principle was on exhibition at the Fair of the American Institute, New York, in September, 1869; it was made at the organ building establishment of Messrs. Hall, Labach & Co., who later applied it practically in St. Thomas's Church, New York, where the organist plays two organs, one directly and one with a separate keyboard, also in front of him, electrically connected with the other organ at the opposite side of the church. The pressure on any key, making contact, sends the current along the corresponding wire, which charges an electromagnet, by the attraction of which the valve of the proper tone opens, in the wind chest of the organ, while in the case of the piano it lifts the hammer.

The main expense is that there must be as many wires aa there are keys, but they may be isolated and combined like's telegraph cable. There also must be as many small electromagnets. The battery may be either near the player or near the instrument or in any point of the circuit, while the keyboard of the player may be a plain keyboard without giving sound, acting electrically on one or more instruments at any distance.

As now the distance on which the current instantaneously acts may be very large, it is not necessary at all to place the ten pianos of Mr. Hachenberg in the same room. I should rather propose to place them in ten different concert halls of a large city and its suburbs; for instance, let the main performer, say Franz Lizst, play on a Steinway grand in the Academy of Music, New York, and let there be an electric connection between this piano and some others in the city, also one in Brooklyn, in Jersey City, Newark, Trenton, and even Philadelphia. What is to hinder to lay the musical cable to Boston, Baltimore, and Washington, so that all these cities would be musically connected, and the performance of a great player in one city be enjoyed simultaneously in all the others? I think that this would be a much more promising plan, pecuniarily, than placing all ten pianos in one room, as then ten times as many people could hear, and pay for, the performance of a single artist.

This my idea, however, appears to be not new, as the London *Athenæum* already has suggested that the organs of the various churches in London be connected, in this way, with the keyboards in St. Paul's, so as to give them all the benefit of the excellent organ playing there. It strikes me, however, that while I found that the clergymen in St. Paul's hurry through their duties there with an astonishing rapidity, it would be difficult for many others of a more sedate temperament, who officiate in the other churches, to prevent being continually interrupted by the music, before they had time to come to the respective ends of their first and second lessons.

I think, therefore, such a plan rather impracticable, and likely to meet with serious and well founded opposition. It would be a much better plan to have in a large city, say New York, Philadelphia, or Boston, a company formed to furnish music to those who desire it. This company could have, at its headquarters, pianos played upon by a set of good performers, engaged for the purpose; to each piano could be attached a cable of wires connecting it with the pianos at the houses of those who desire to be supplied with music, in the same way as they are already connected by means of pipes, with the gas works or reservoirs, in order to be supplied with gas or water. If any one wants music, he only has to turn it on, the key being a simple arrangement to make metallic contact with the cable, and then the piano starts at once and plays the music which is being performed at the musical depot or headquarters. This special arrangement of being able to turn the music on and off, *ad libitum*, like gas or water, is an essential condition in my plan, as it would be very undesirable to be obliged to have to listen to all the music the headquarters could furnish; it would be almost as bad as to be obliged to use all the water or gas that would be supplied, in case we had no stopcocks to keep it shut till wanted. Another advantage of this musical shutting off arrangement is that we may stop the piano at any time without insulting the player, which will be appreciated by all who have been obliged to listen to music, out of mere politeness, while they rather would talk.

But as there are many kinds of music, while there is but one kind of water or gas, it is necessary to have a choice in order to have the music appropriate to circumstances. A polka at a funeral, or "Old Hundred" at a dancing party, would be somewhat out of place, and therefore I propose that there should be, at the musical depot, several sets of players, one set for sacred music, one for dancing music, one for classical music, one for operatic selections, etc. Each set has a separate room with an instrument, and plays in succession continually, according to a programme previously selected, printed, and published in the newspapers. The inhabitants of the musically blessed town have then only to look at their watches to see what music they may get, and if the time for the desired piece has arrived, turn it on; or, if they are not particular about the piece, they may choose any time between different styles, and may be influenced by serious or lively performances, according to their desires. Or, for the sake of simplicity and economy, different styles could be performed on a single piano at different set hours, say a collection of sacred music for the morning hours, at that time that family prayers are most likely going on dancing music at night, when the young folks are keeping parties, etc.

In regard to the expense of being furnished in this way with any amount of music, I dare say that it would be a trifle, compared by that spent by the head of a family of daughters, when they take, year after year, music lessons. Besides we must take in consideration the enormous saving of time to the young ladies in not being obliged to study an art in which most of them never attain any proficiency, and forget all about it afterward. What a field opens itself here for the promotion of woman's rights! How many could then devote themselves to politics, which is a much more profitable business than drumming on the piano! And the most glorious result of all would be that the electromagnetic musical telegraph company would be the most active agent to accomplish the emancipation of the female sex, now oppressed by being obliged to lose so much time in studying music in addition to other absolutely necessary accomplishments.

New York city.

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Corn Sheller and Vegetable and Meat Slicer.

We have been much pleased by an examination of this simple machine. We say simple—a machine that consists of only four moving working parts, and that will accomplish what this will, is certainly entitled to that appellation.

It consists of the toothed disk, A, turned by the winch, B, the concave, C (held up to its work by the spring, D), and the meat or vegetable hopper, E, with the pivoted and movable side, F.

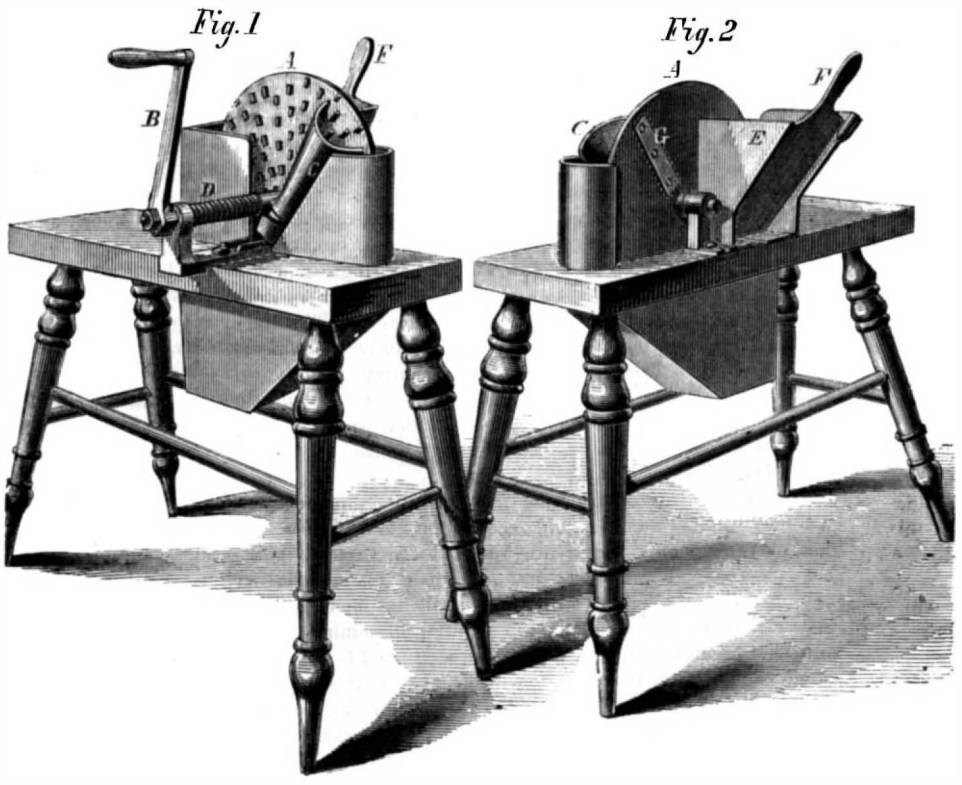
Corn is shelled by putting the ears into the concave, C, and turning the winch. The teeth on the disk, A, meet with and shell off the kernels, as the ear drops, by its own weight, down through a chute provided for it; and the corn may be caught below in a basket.

In the disk are formed slots to which are adapted knives, G, on the side opposite the teeth, as shown in Fig. 2. These are the meat or vegetable cutters. The substance to be sliced is placed in the hopper, E, and pressed up against the knives by the handle in the pivoted side, F, of the hopper.

This may be done by one hand, while the other turns the crank, the operation proceeding with facility, the operator sitting on the bench.

Machines of this kind are made with he hopper, E, extending the whole width of the disk, so as to admit two heads of cabbage, if desired.

This simple and useful machine was patented May 3, 1870, by Jeremiah P. Smith, whom address for further information, Schuylkill Haven, Pa.



SMITH'S COMBINED CORN SHELLER AND VEGETABLE AND MEAT CUTTER.

Sleeplessness.

The best anodyne is a liberal amount of muscular activity out of doors every day. Persons who sit around the fire and lounge on the sofa, or read or sew a great part of the day, need not expect sound sleep; only the laboring man can taste it in all its sweetness.

Many fail to sleep at night because they will persist in sleeping in the day time. It is just as impossible to healthfully force more sleep on the system than the proportion of exercise requires, as to force the stomach to digest more food than the body requires. Rather than court sleep by industrious activities, many persons resort to medicine, and every new drug which is heralded as a promoter of sleep becomes at once immensely popular, even though it is known to possess dangerous qualities.

Chloral hydrate has had a great run, and even young men are known to be purchasing it at the drug stores, to be used in promoting sleep; it should never be taken unless advised by the family physician, for the medical journals are constantly publishing cases where serious harm and even fatal results attend its habitual use.—*Journal of Health.*

Improved Builders' Scaffold.

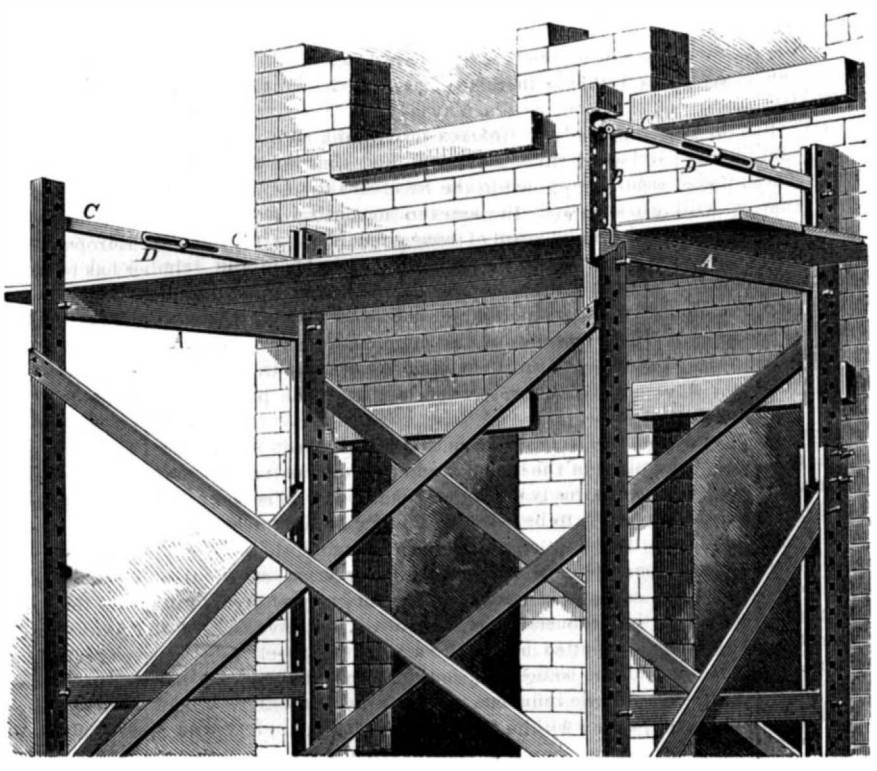
This is a very simple and cheap modification of the support of builders' scaffolding, whereby the workmen may elevate or lower themselves, together with the platform and its burden of tools and materials, without dismounting from the platform.

The supports of the scaffold are provided with holes, as shown, into which wood or metal pins are thrust. These pins support the crossbars, A. These crossbars are connected with links, B, one of which is shown in the engraving, a portion of the frame of the scaffold being broken away to show the position of the link relatively to the frame. These links are pivoted to the ends of the jointed levers, C, the joints, D, of the levers being slotted, so that they may be depressed or raised in the center without becoming disconnected. The outer ends of these levers rest upon movable pins placed inside the links.

The workman, stepping to the end of the platform, may depress the middle joint, D, which will, through the links, B, raise the end of the platform. Another workman then adjusts the pins to hold the platform thus raised, and the same operation is repeated at the other end.

In this way, the platform may be elevated to any extent desired; or, by reversing the movement, it may be lowered. The practical character of the invention will be apparent to carpenters, masons, and house painters.

This improvement was patented through the Scientific American Patent Agency, August 29, 1871. Address, for further information, Redick & Kunkle, Butler, Ohio.



REDICK'S BUILDERS' SCAFFOLD.

Cottrell's Improvement in Printing Presses.

The invention of Mr. Calvert B. Cottrell, of Westerly, Rhode Island, relates to improvements in that class of presses in which the reciprocating table is arrested by an air spring. The air spring apparatus is arranged for automatically increasing the quantity of air acted upon as the speed of the machine increases and greater pressure is required to arrest the table, and for diminishing the quantity as the machine slows, so that the movements of the table will be equal, whether running fast or slow, and the action of the machine will be more uniform in other respects.

Those familiar with this class of presses are aware that the motion of the heavy table is arrested by the action of a piston which enters a cylinder, and, compressing the inclosed air, is thus gradually brought to rest.

The varying the quantity of air, acted upon according to the speed of the table, is accomplished in Mr. Cottrell's improvement by allowing a considerable quantity of air behind the piston to escape when running slowly, thus making the pistons act upon a smaller quantity, which, being properly regulated according to the speed of the table, admits of always having the table stop at the same point. To this end, he makes tubular connections, from the air cylinder to a drum cylinder, for a check valve, to be opened more or less to let the air escape. For varying the speed of the valve, he employs a speed governor or regulator, such as is commonly employed upon steam engines for actuating throttle valves, gearing the said governor with some part of the machine, so that its speed will be governed by the speed of the machine, and arranging it with the check valve so that, as the speed increases and the balls rise or swing away from the axis, the valve will be closed. He also connects a pressure gage with the air cylinder, or any other suitable part, to indicate the compression of the air and show the variations thereof due to different speeds, and to facilitate the adjustment of the governor for varying the openings of the valve for any given speed.

The governor always opens the check valve on the stopping of the machine, so that the air will be allowed to escape from the pistons when starting, thus avoiding the necessity of compressing the air when the driving belt has but little adhesion to the pulley or when the table is moved by hand, as is sometimes required.

A HUNDRED years of wrong do not make an hour of right.

How it Burned.

There have been not less than nine hundred causes assigned for the Chicago conflagration by people who, residing many miles away and knowing nothing about the circumstances, may be supposed to be as "unprejudiced" as Johnson's ideal critic on the subject which they treat. A majority of the opinions attribute the calamity directly to the "wrath of God;" some assigning one cause and others the opposite for the aforesaid wrath, A Toledo opinion lays it all to petroleum, and locates the oil in the pores of our building stone The foundation for this theory consists in a statement made in a late number of *Silliman's Journal,* that many houses in this city are built of an oil bearing limestone found hereabouts. The sudden combustion of all buildings in the track of the fire furnishes the rest of the evidence. We don't know how the advocates of this theory will reason when they learn that the Second Presbyterian Church, the only edifice built of the "oil bearing" stone, is the best preserved ruin in its neighborhood, much better for instance than the Field & Leiter store, of Westchester marble. Perhaps they will have to fall back upon *Silliman* to explain that phenomenon, or else upon the wrath of God in general, leaving petroleum walls, pine pavements, the Fire Commissioners, and the O'Leary cow all out of the account. The fact is, it is difficult to see how the fire, having got the start that it did at De Roven street and again at "Conley's Patch," could have burned any less than it did. The roofs and sidings of acres of wooden buildings were dry as touchwood in the first place, and were then rendered trebly inflammable by the furnace heat with which the wind surrounded them. This wind—the hardest known here in many seasons—not only wafted brands upon all roofs and under all cornices, and awnings, and sign boards, through all windows, shivered by the heat, but acted as powerfully as the most powerful blowpipe in furnishing oxygen to feed the flame. If any person wishes to see why Chicago burned, he has only to construct a small model of a store or house—made of and filled with such materials as are usually put into stores and houses, place the same in the blast furnace of an iron mill, and see how it will come out when the blast is over.—*Chicago Tribune.*

Ryder's Improved Candle.

In this invention a new manner of arranging wicks in candles is employed, with the object of enlarging the flame and utilizing to the fullest extent the combustible material. The invention consists in so applying two or more braided wicks to one candle that, without the aid of other devices or substances, their burning ends will turn away from each other.

In braided flat wicks, the opposite faces differ from each other by having the strands on one converge downwardly while on the opposite side they converge toward the upper end. When one end of such a wick is ignited, it will be bent to that side on which the strands converge upwardly toward the flame. This bending is effected by the position of the strands, for when burnt, they meet on top, and their upper ends, being liberated, will bend under the influence of the heat, while on the other side, where the strands converge downwardly, they are always held at and braced by the lower junctions. The heat tends to twist and curve the burning wick, whose strands when it becomes disintegrated on one side, will, on just that side, bend in a direction where they are unopposed, and draw the entire burning portion of the wick to the same side.

Thus, when a candle carrying two wicks is so constructed that those sides of the wicks where the strands converge upwardly are on the outer sides, the burning ends of such wicks will both be bent or curved outwardly. The flame is thereby enlarged, and the consumption of oxygen consequently increased, so that the quality of light is also improved.

This is the recently patented invention of Mr. Henry Ryder, of Bristol, Mass. The candles thus made do not require snuffing, and on this as well, as other accounts, are particularly adapted for use in railway cars, omnibuses, etc.

AN AUSTRALIAN contemporary draws a picture of a New Zealander, 2,000 years hence, coming to Victoria and extracting gold from the tailing of the deserted gold fields. And yet this is no caricature or exaggeration, for a similar thing is now taking place in Greece. The silver mines of Laurium were abandoned as exhausted 300 years, B. C.; but a company is now working the *scoria,* rejected as worthless twenty-one centuries ago, and has created a community of 4,000 persons whose livelihood is drawn from this occupation.

A PRUSSIAN engineer has, it is said, invented a machine which will manufacture ice without chemicals, merely by compression and expulsion of air. A machine makes two tuns of ice per day, and the capacity can be increased to twenty tuns.

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SUITABLE BUILDING MATERIAL FOR CITIES.

Recent events have turned the attention of thoughtful people to a consideration of the question of building material for large towns. It no longer appears proper to permit indiscriminate constructions, where the safety of a whole community may be endangered. We have, in large cities, superintendents of buildings, but they generally confine their attentions to the question of security against falling, and not to the character of the building material, excepting in so far as wooden structures may be prohibited in certain districts. There would now appear to be cogent reasons why commissioners should be appointed to secure greater precautions than the mere question of wood and iron. A mixed commission, composed of builders, architects, underwriters, firemen, and scientific experts could be appointed to study the whole subject and report thereon to the government. This commission could very properly decide upon the survey of streets, and the width, the kind of pavement and flagging to be used. They could lay down water pipes and establish hydrants at suitable distances, and see to proper arrangements for extinguishing any fires that might arise; but the most important duty to be assigned to them would be the control of building material in certain sections of the city.

By insisting upon the construction of a row of buildings, up and down and across town, as nearly fireproof as it is possible to make them, a wall, impervious to fire and constituting a barrier impassable to any ordinary conflagration, would arrest the flames and save whole sections of the city. A street, built up entirely of fireproof buildings, would be a novelty; but in the light of recent events, it would appear to offer great protection, and it may be worth while to designate what streets shall be of this character, and then insist upon a compliance with the prescribed style of building. Having adopted some such plan as this, the commission would have to study the kind of building material best adapted to city structures, combining security and durability with reasonable economy. This opens up the whole question of the comparative value, for building purposes, of wood, iron, and stone. They tried wood in Chicago, without having treated any of the material with the numerous agents that have been recommended to render it incombustible; and the sad consequences of this neglect ought to serve as a warning to all other cities. If the wood had been saturated with soluble glass, ior soaked first in phosphate of soda and afterwards in chlorde of barium, it could not have been set on fire. The latter mixture may be too expensive for use on a large scale; but silicate of soda, or soluble glass, can be obtained in sufficiently large quantities, and at such reasonable rates, as to admit of the preparation of the shingles, clapboards, and all exposed portions of frame buildings. Any such precaution as this has the double advantage of protecting against fire, and securing against decay; and, in the long run, would be found to be the greatest economy.

If people will insist upon constructing frame buildings in large towns, they ought to be compelled to render them essentially fireproof by the above chemical mixture. So many experiments have been tried with soluble glass that the security it affords against fire and decay may be considered as fully determined. Wood thus prepared will char and smolder, but will not burst into flame; and hence there could be no scattering of cinders or blowing about of firebrands.

Where frame buildings are tolerated, the fire marshal might justly insist upon a chemical preparation of the wood—an operation that could easily enough be done, if it were imperatively required. The scientific experts on the commissions would be apt to report in accordance with the principles laid down above, and by degrees the dealers in lumber would learn how to furnish a building material nearly as durable as iron.

In reference to the use of iron for houses, the facts, that it is employed to a large extent, and that we are constantly acquiring greater skill in its manipulation and management, are sufficient proof of its practicability. In Chicago, however, this material proved unavailing, for the reason that the wooden structures made a fire hotter far than a blast furnace constructed to melt pig iron. No iron could stand such a heat, and it melted down like wax. This was not the fault of the iron, but caused by the neglect to prepare the wood against such an emergency; and no one will be likely to condemn iron structures on account of their failure in Chicago.

A third building material is stone, and this may be divided into the native and artificial. There are a good many varieties of stone suitable for building purposes; but the cost of quarrying, transportation, and working, is so great in this country as almost to shut this material out of competition. This objection does not apply to artificial stone. The lime and sand required to make artificial stone can be found nearly everywhere. They can be mixed by simple machinery, and require no labor to cut them into shape; but the plastic material can be run into any kind of a mold, where it dries in a few hours, and one layer after another can be carried up in marvelously short time.

For rapidity of construction, for durability, for security against fire, for warmth, and ventilation, for dryness and health, for economy, for architectural effects, there is nothing like artificial stone; and we look upon this material as the most suitable for cities and as probably destined to supersede all other. It only needs the popular dissemination of information on the subject to occasion a demand for artificial stone; and as soon as such a demand is created, this material can be furnished in any quantity in all parts of the country; and we shall have it for our cellars and our ice houses, our sewers, cisterns, wells, water pipes, paths, roads, schools, churches, dwelling houses, and stores, in a way that will make us wonder how we ever performed the slow and tedious labor of hewing out stones or laying up brick, when we could have formed a whole house at one casting—as Krupp pours the melted steel into molds, and produces a cannon of any size.

In a country where labor is as dear as it is with us, where wood is becoming scarce, where iron is needed for other purposes than houses, where the native rock is difficult to work, the suitable building material would appear to be artificial stone.

DR. CROOKES AND PSYCHIC FORCE.

Dr. Crookes is a bold man, or he never would have braved the storm of ridicule he has invoked by the assertion that the manifestations, which have hitherto been ascribed to spirits or to legerdemain, are simply the result of a natural hitherto unrecognised force residing in the human organism. He is also a candid man, as is shown by the way he discusses this question with those whose insinuations must be irritating in the extreme. That he is an earnest man, none who know him through his previous labors will deny. To admit these characteristics is to admit that their possessor is entitled to a certain degree of respect, even if ability, which alone can make them valuable in scientific research, should be lacking.

But the past record of Dr. Crookes proves him no intellectual pigmy. He has been a power in the scientific world. These facts entitle every assertion he makes to the belief that we willingly accord to the asseverations of men whose veracity stands proved by years of honest record.

We therefore accept the statements, made by this investigator relative to certain results obtained in his experiments with Mr. Home and others, published in another part of this paper, as correctly describing the deflection of the mahogany board, the increased tension of the spring balance, the tracing of curves upon smoked glass, and the taps upon the parchment disk.

Some force actuated the apparatus that thus moved. Was it a force that resides in the human organism, or was it some other force or forces already known to scientists? Dr. Crookes thinks he has shown it to be what he calls "psychic force;" but we submit, that while, upon his own showing, there is some ground for inference that the persons present, called "psychics," had some connection with the effects produced, the nature of this connection is not proved by anything yet said or done, or written, by Dr. Crookes. It is merely inferred that out of the bodies of these persons proceeds a curious and inexplicable influence that fitfully acts with, or opposes, gravity, at the will of the "psychic."

Dr. Crookes seems to be surprised that his experiments are not now accepted as conclusive proof of such a force. But it would be far more surprising that they should be so accepted. All known forces act uniformly upon the establishment of known conditions. When first discovered, it was by the establishment of such conditions that their existence was demonstrated. When it has been desired to use them, the same set of circumstances, under which they first became known to man, invokes them at once.

Not so with the psychic force. Dr. Crookes arranges his apparatus, brings in his psychic, and yet often fails to obtain results. Unlike Galvani, whom he quotes, he cannot always make his frog kick. If it be objected that certain unknown conditions, in the bodies of psychics, must spontaneously, or at least independently of any external agency, be set up, in addition to the proper adjustment of apparatus, then we say that the existence of psychic force remains undemonstrated; for force only manifests itself in a specific recognizable form under certain regular conditions of its action. When we see a body moving away from the earth we know that some other force than gravity has for the time control of it, because gravity, like other forces, acts according to fixed laws, and, unopposed by adverse conditions, draws bodies towards the earth's centre. There is nothing fitful, capricious or intermittent about the action of any force by itself.

Variations appear only under conditions which always accompany apparent changes.

Thus, suppose that some one had, for the first time, felt a shock upon touching an electric eel, and, repeating his experiments, should find the shocks, after a time, discontinued. Having first attributed the sensation to the force emanating from the eel, he would now doubt that this animal was the source of the influence, and would look for other causes. Not till he found that the shocks uniformly ceased upon the exhaustion of the fish, would he satisfy himself that the force really resided in it. Variations in the manifestations of a force must, therefore, be traced to uniform conditions, as they are really a part of the characteristics which enable us to place the force in its proper category.

Dr. Crookes takes the ground that this is no argument against the existence of psychic force. He not only—to use his own language—fails to furnish "any dynamic equivalent of psychic force, or any formulæ for the varying intensity of Mr. Home's power," but he fails to account for the sometimes total cessation of its action under circumstances apparently precisely like those under which it acts with maximum vigor.

Some more definite relations between the effects and their cause must be established before psychism will take its place in the list of physical sciences.

AMERICAN FORESTS.

What with the immense drafts made upon the store of valuable timber possessed by this country, and the terribly destructive fires that almost annually visit some portion of our wooded regions, we are fast reducing our supply, and raising the value of industrial woods in the market.

Still we seem to regard the end as something remote, and to imagine that something will turn up ere our timber shall become exhausted. We speak of the exhaustion of the English coal fields, which, at present rates of consumption, will have been reached about *Anno Domini* 2,971, as something to be dreaded, but at present rates, we may fix a much nearer date for the total denudation of our valuable forests, the annual drain upon which now far exceeds the natural growth, and is constantly increasing.

We have more than once endeavored to awaken a realization of this fact in the public mind, which, however, contents itself with present plenty, and puts away the thought of anticipated evil.

The industries employing wood, as the basis of their operations, are of a magnitude scarcely second to any on this continent. We have perfected machinery, for working timber, that is marvelous in the speed and delicacy of its operation, yet the time will come, unless our forests are preserved, when the majority of these industries will have passed away.

Now, there are vast tracts of country where scarcely anything except timber can be properly cultivated, and, by proper attention on the part of the General Government, the oftimes worthless, or comparatively worthless, timber now growing upon them, might easily be replaced by that of great value in the arts. There is no more reason why we should not cultivate oak, or hickory, or pine, than corn or wheat.

The trouble has been that we have looked upon the timber supply as practically inexhaustible, and so have overlooked a means of perpetuating and increasing this element of our national wealth.

In Europe, where the importance of a liberal supply of timber has been long felt, active measures have been taken on the part of various governments to protect existing forests and encourage the cultivation of timber. It is estimated that there yet remain in France 2,700,000 acres of State forest, the revenue of which, previous to the recent war, was $8,700,000. Bavaria has about 2,000,000 acres of forest; Prussia, as it existed before the war, had upwards of 5,000,000 acres. In each of these countries, schools of forestry, under State control, are supported, in which men are trained in the scientific and economical management of the State timber lands.

The attention of England has been turned to the preservation of the sal and teak forests in India. Of the latter, it was found that, within eight years from the time the forests of the native princes were thrown open to the public, teak timber, suitable for government use, was becoming scarce in Madras and Bombay. The opening of these forests was in 1822. The sal forests are more extensive. Those belonging to the British Government cover 3,500 square miles; but it is estimated, by good authority, that a rest of at least fifty years would be requisite to make good the inroads upon this supply.

Surely our timber is as worthy the attention of the Government as our mineral wealth, and it is high time that some means, like those adopted in Europe, be employed to save and develop it. The origin of the fires that do so much havoc ought to be investigated; and, if possible, means of prevention adopted.

As one means of protection against fire, we suggest that artificial breaks in the continuity of forests would, if they could be made practicable, aid somewhat in preventing the progress of a conflagration, especially if the cleared spaces were brought under cultivation. In extraordinarily dry weather, a fire might probably cross three or four miles of cultivated

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land, but in most seasons this could hardly occur. If, in placing the public lands in market, alternate sections, of sufficient width, were first sold, the intervening ones being reserved, the tendency would be to ultimately break up the forest regions in just the way indicated.

As to those reckless persons who, careless of results, fire burning wads, throw stumps of cigars or knock the fire out of their tobacco pipes, into dry leaves, regardless of the extent of damage to which their carelessness may lead, it is probably difficult to reach them by law, but something might be done toward awakening in them a sense of moral responsibility by properly circulated printed warnings, and appeals to their humanity. Such a course would tend to render the thoughtless thoughtful, and would lessen risks.

It is to be hoped that the attention of Congress will be called to the importance of this subject at its next session; and that at least some experimental attempts will be made to lessen the enormous waste which now goes on entirely unchecked by any effort to prevent it.

GENERAL REFLECTIONS SUGGESTED BY THE FAIR OF THE AMERICAN INSTITUTE.

It would be strange if such a display of mechanical, chemical, and general industrial improvement, as is now on exhibition at the Fair of the American Institute, should fail to suggest many valuable hints to the thoughtful mind.

There are thousands who go to such places merely for amusement, and for such there is generally plenty of food for mirth in the eccentricities of exhibitors and spectators, and the amusing incidents that are sure to take place in any large gathering of people.

There are others whose minds are ever on the alert to gather some crumbs of instruction from every thing with which they come in contact. Such will see, in many things displayed this year, that mechanical invention, asserted by some pessimists to be on the decline, is really in the full pride of its strength; that it still retains its eager scent for novelties, and that, the combinations of crude elements into new forms of beauty and usefulness being infinite, there can be no such thing as an end to invention.

One of the most striking of the features of this year's display, is the advance made in cutting and working hard materials. The diamond rock drilling and stone sawing, and, the greatest triumph of all, the process of cutting stone, glass, and even more refractory materials, by the simple agency of a sand blast, have placed resources, at the command of the engineer, the architect, and the decorator, that open an entirely new field of industry, into which an army of workers will be shortly introduced.

No one can pass through this collection without observing numerous new applications of electricity in the arts. If this force fails to give us a motor, of sufficient power and economy to propel machinery, it furnishes one of the very best means of controlling other forces, almost imparting intelligence and feeling to the performance of automatic machinery, and acting with a delicacy approaching the sense of touch. It is evident that the uses of electricity are destined to become far more widely extended than at present, and it may be that even that grandest of human achievements, the electric telegraph, may find its peer in other applications of this subtile yet docile force, that, like light and heat, pervades the universe.

The various displays of ornamental art show, strikingly, the increase of desire for luxurious living, and the endless craving of the human heart for something more and better than it already possesses. This craving has kept the demand, for everything that human ingenuity can produce, fully up to the supply, and will so continue it, no matter how many and various may be the productions which loom, forge, the sculptor's chisel and the painter's brush, throw upon the market. "The eye is never satisfied with seeing," said Solomon, and so long as inventors produce novelties, just so long will they find them absorbed into the multitude of things which taste and the means to gratify it collect in modern homes.

In the steam engineering display are to be found ample evidences of two important tendencies of the time, namely, to the increased use of sectional and safety boilers, and the employment of all attainable safeguards against neglect of boiler tenders. People have been, by numerous destructive accidents, thoroughly aroused to the importance of caution in the use of steam, and desire to enforce careful attendance by the use of tell-tale appliances, that bring carelessness into light; and the general feeling, among those who use light steam power, seems to be that safety is preferable to economy, if both cannot be secured together. For light powers, also, simple forms of engines, having few parts and complications, are preferred to those of more complicated forms, even though the latter may give more economical results.

In household and domestic appliances and utensils, there is a constant accession of new inventions; and judging from the favor many of these simple yet useful things seem to obtain, there must be always purchasers for any meritorious novelty in this line. There is a great variety of these articles at the present fair, and the interest taken in them shows that, after all, the homely things of practical utility are even more attractive to the average mind than works of art.

Of the latter, there are enough exhibited to show that, in the arts of design, the country is making rapid strides, and may hope to rival older countries in this field. as it has surpassed them in others.

Not to extend these rambling thoughts to a tedious length, we will conclude by remarking that the educational influence and power of such exhibitions, upon the public mind, can scarcely be overrated. In them are combined, in the most attractive manner, both instruction and amusement, without any objectionable features. For these reasons, they should be well encouraged. Every parent who desires to instil healthy tastes and principles into the minds of youth has an interest in their support.

USE OF SODIUM FOR BLASTING.

The employment of sodium for blasting rocks has been frequently proposed, and numerous experiments have been tried. The subject is again revived, and we have some of the figures upon which its use is founded. To decompose 9 parts, by weight, of water, 23 parts, by weight, of sodium, are required; and the product is 31 parts of soda and 1 part of hydrogen. If we employ 46 grammes of sodium, this will evolve, with 18 grammes of water, 2 grammes of hydrogen, which occupies a space equal to 22,471·9 cubic centimeters. If the sodium be sealed up in a glass ball of the capacity of 50 cubic centimeters (46 grammes sodium occupy 44·7 cubic centimeters), the hydrogen gas will exert an explosive force against the walls equal to 450 atmospheres. In the practical application, it is proposed to take two glass bulbs connected by a thin tube. In the upper bulb is placed the metallic sodium; in the neck between is formed a soluble salt, and in the lower bulb is drawn some water, when required for use. By filling the lower bulb with water, and inverting it, the salt will gradually dissolve and give the water access to the sodium, and the explosion follows.

The bulbs can be safely transported, as the water is put in like a charge of powder, and the length of time required for the melting away of the intervening salt can be calculated.

For submarine blasting, for employment in crevices, for hollow trees, and other purposes in which gunpowder is not easily available, a fuse of metallic sodium can be highly recommended.

PROPULSION OF STREET CARS.

The writer well recollects how, in his youth, together with other mischievous boys, he used to hang an old red flannel shirt on the fence of a pasture in which was inclosed a bull. Then hiding in an adjacent thicket, it was considered glorious fun to watch the irritated animal, as he would paw, and bellow, and finally charge at the shirt, usually going through the fence; when, before he could recover himself, the shirt was withdrawn from his sight, through the agency of a piece of strong twine, and the enraged animal would recover his temper in his supreme astonishment at his supposed complete destruction of the irritating object.

The public, like this bull, often rushes pell mell at any proposed innovation, without stopping to consider whether there is any good ground for its opposition. It is always ready with objections against anything new, whether it has reason on its side or not.

Inventors have been busy working out ways and means to propel street cars without the aid of horses. Few of them have stopped to consider, that, when they have solved their problem, they will have another to solve, namely, how to allay the foolish fear that such cars, running by steam or other power than that furnished by animals, will frighten horses.

When carriages were first introduced, they were strenuously objected to, and it was even attempted to suppress them by law. When Stephenson was endeavoring to convince the public of the practicability of steam railways, a member of parliament objected that cows would get in the way of the locomotives and be killed; yet we have now plenty of carriages and locomotives, and the world appears to have benefitted by them.

An inventor, who has been a long time experimenting on the practicability of propelling street cars by steam, remarked to us the other day that, were he to put up a brass Yankee clock on the front of one of these vehicles, and demonstrate that he could thus draw cars at the proper speed, the public would object to their use.

Now, not one man in a hundred, in any large city, owns a horse, and not one horse in a hundred is of such bad disposition that he could not readily be broken to tolerate, in the most dispassionate manner, the passage of a street car that ran without horses. So that this objection, sifted down, amounts to the assumption of the privileges of one person in ten thousand as paramount to the interests of all the rest.

There are no doubt many ways in which the application of steam could be made to street cars, which would meet the objections to smoke and ashes discharged in the street, and the puffing of the exhaust. In fact, we know of more than one invention in which these drawbacks have been obviated. Such objections can not lie against the ammonia engine of Dr. Lamm, illustrated and described in our last issue.

There are, however, some requirements in engines for this purpose that many inventors have overlooked. One of these is the ability to mount grades without carrying a surplus of steam on levels. To do the latter, is to waste fuel; and to raise steam quick enough, on the approach to short grades, if not impossible, is, to say the least, not the most scientific and mechanical way of accomplishing the desired object.

The better way is to use the minimum power, required for ordinary grades, for surmounting heavy grades, the latter being ascended slowly enough to permit this.

There are several ways in which this has already been done; the more important of which are, the use of gearing to slow down the motion of the car, while the engine makes the same number of strokes per minute; and the use of a compound engine, the large cylinder of which is worked at high pressure while ascending grades. Either of these plans accomplishes the end sought, but neither seem to provide for that nice adaptation of power to the character of the work to be performed, in a way to satisfy the ideal of nicety in the operation of an engine, as attained by the link motion on locomotives.

There is a wide field for invention in providing the means for drawing cars on city and suburban trainways, and, if we mistake not, the time is nearly ripe for their introduction. We know of several important companies that are anxious to get rid of their bondage to horse-flesh, and some of them are even now experimenting to find the invention that will emancipate them from an expensive and unsatisfactory system.

IMPROVEMENT IN PAVEMENTS----ARTIFICIAL STONE FLAGGING FOR SIDEWALKS.

Our readers will recollect an article on artificial stone, published on page 336, Vol. XXII of the SCIENTIFIC AMERICAN, in which special reference was made to an artificial stone, manufactured by Mr. Herman A. Gunther, now of the firm of H. A. Gunther & Co., 460 Broome St., New York. The basis of this stone is Portland cement and sand, which is treated in a peculiar manner by a chemical solution which greatly increases its hardness and durability. Coloring matters are added by which very exact imitations of the blue and brown stones, so popular for building purposes in this country, are produced in a very rapid and cheap manner.

Mr. Gunther has recently patented, through the Scientific American Patent Agency, an improvement in the use of this kind of stone for flagging side walks, by which stones may be manufactured *in situ*, in squares or diamonds, and still be capable of being taken up without injury, and relaid whenever desired.

The blocks being formed by the aid of suitable molding strips, which separate the stones by about three sixteenths of an inch, the interstices are filled with a peculiar elastic waterproof composition which allows the artificial flags to contract from cold or expand with heat, obviating all danger of cracking from this cause, and, at the same time, preventing the percolation of water to the substratum, thereby preventing subsequent upheaval by frost.

A large piece of sidewalk has been thus flagged, at the corner of Lexington Avenue and Fifty-seventh street, in this city, which we recently visited and examined, and we must say that it would be difficult to conceive a handsomer piece of work, of its kind.

The flags are an artificial blue stone, of great density and hardness, presenting a perfectly level surface, very much superior to the undressed natural flag-stones in common use, while they can be laid at about one fourth the cost. The flags are four inches thick, and we see no reason why they should not prove as durable as the natural stone, since we are aware of experiments extending through three years, with stone of this kind, which have tested its power to resist, to the utmost, atmospheric influences, and which it has endured perfectly.

We regard the improvement as one of much importance, as the difference in first cost will allow the artificial stone to be relaid several times, at less expense than the first cost of the natural stones.

THE HEALTH OF BARON LIEBIG.

From a private letter received in this city, we learn that Professor Liebig is by no means restored to his former state of physical and mental activity. He spent the early part of the summer at the baths of Kissingen, and was much benefitted by the treatment; later in the season, he went to meet a few choice friends, among them his life long colleague, Professor Woehler, at Reichenhall, where one of his sons is a physician; and here, in the invigorating mountain air, his bodily infirmities disappeared; but he complains of dizziness and suffering whenever he attempts the least mental exertion. We fear that the illustrious chemist will hardly be able to enrich our literature with many more of the brilliant writings which have rendered the science, to which he has devoted his best years of his life, so useful and so popular.

Liebig may be justly called the founder of modern chemistry. It was he who first organized laboratory instruction, and rendered it possible for pupils to pursue an experimental science in an experimental way. This has been his chief service, but another almost equally important contribution to the cause of learning has been the popularization of science accomplished by his writings.

Howe's Tobacco Dressing Machine.

This is a machine invented by Mr. James H. Howe, of Utica, N. Y., for loosening and separating the strings of fine cut tobacco, which adhere together, after being cut, on account of the packing of the leaves previous to cutting, and of the adhesive substance used for sweetening the tobacco.

The invention consists in a hopper with a flexible bottom, in which the cut tobacco is placed, two or more pairs of rotary beaters acting against the flexible bottoms by revolving under it, in a manner to thoroughly separate and loosen the strings from each other, and to work the adhering bunches into soft fleecy masses.

The tobacco, when cut from the thick mass of leaves packed together, adheres in thin ribbons or shavings made up of strings, connected side by side, and is commonly separated and loosened by a rapidly up and down shaking machine, which is expensive to keep in repair owing to the great wear and tear occasioned by the rapid movements necessary, and the sudden stopping and starting. Such machines are also objectionable on account of the great amount of power required to operate them.

In Mr. Howe's machine these objections are avoided. The motion being slow and the moving parts operating continually in one direction, require but little power, and the wear will be slight, while the work is claimed to be accomplished in the most satisfactory manner.

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OUR CHICAGO EXCHANGES.

Chicago exchanges? Yes! they are creeping out of the cinders, like singed cats, much better than they look. Glad to see some of their old faces again. We recognize them, though their visages bear marks of their recent terrible ordeal. Courage! "Time makes all things even."

First here is the *Railroad Gazette*, a most excellent weekly journal, devoted to Transportation, Engineering, and Railroad News, looking quite fresh and not at all frightened. It was formerly published at 63 and 65 Canal street. The whole establishment was cleaned out by the fire, but its enterprising proprietor, Mr. A. N. Kellogg, states that the paper will, until further notice, be issued by the acting publisher, Mr. W. H. Boardman, at No. 72 Broadway, New York. The trade will address orders to the Western News Company, corner of Jefferson and West Randolph streets, Chicago, as heretofore.

Then comes along the *Chicago Railway Review*, another live journal devoted to Railways, Navigation, Manufactures and Finance, somewhat smaller than of yore, but not a whit less spirited. The reduction in size is announced as only temporary, and the editor, Mr. D. C. Brooks, thus apologises for defects: "Typographical errors were, we fear, the exceptions which proved error to be the rule, last week. The Editor, in addition to his usual duties, had to act in the capacity of publisher, assistant foreman, mailer, carrier, collector—not to say "devil;" and it is not to be wondered at that something, or the want of it, played the d—l with the types."

The present address of the *Review* is Chicago, 1603 Prairie avenue, or at St. Louis, Barnum's Hotel, or 215 Pine street.

Mr. Charles D. Lakey, editor and proprietor of our valued contemporary, the American *Builder*, writes to say that he is, among most other publishers, a sufferer by the fire in Chicago, his office being destroyed. He desires us to announce that the *Builder* will be continued, and its publication will recommence as soon as practicable. "The good will of the public towards my magazine remains unchanged. Fortunately, my house was not in the path of the flame." The public will join us in expressing great regret for Mr. Lakey's loss, and in a hope that his excellent publication will soon be again circulating through the length and breadth of the land.

The *Land Owner*, which was one of the most beautifully printed of the Chicago papers, and which was undoubtedly the most widely circulated land paper in the world, is—writes the publisher, J. M. Wing & Co., 58 Canal street—in press, and its publication will be continued as heretofore.

Our editorial friends, who have suffered by this great fire, will receive our most hearty expressions of sympathy, and their speedy resumption justifies the hope that they have yet a long and prosperous career before them.

RECENT PATENT DECISIONS.

In the matter of the application of E. S. Renwick for letters patent for improved suspender ends. Appeal from Examiners-in-Chief, August 8, 1871.

LEGGETT, Commissioner:

The applicant claims that he has invented a new article of manufacture, named by him "Veneered Leather Suspender-Trimmings." His process of manufacture consists in pasting shammy leather upon the surface of roan leather, and from sheets thus prepared cutting the trimmings out with the dies in common use for such purposes, and then stitching with a sewing machine.

This process of "veneering leather" is not new, and could hardly be called an invention if it was. The process of pasting different pieces or kinds of leather together, and then stitching, has long been known among manufacturers of all kinds of leather articles. Suspender trimmings, manufactured by this old and well known process, certainly cannot become a new article of manufacture in such a sense as to be patentable. But, waiving this point, it seems to me that the references made by the primary examiner were complete answers to the application.

The decision of the Board of Appeals is affirmed.

MILLIGAN AND HIGGINS' PATENT.

In the matter of the application of Milligan & Higgins for letters patent for calcimine powders.

LEGGETT, Commissioner:

Calcimine, as generally used, is a compound of water, glue and a white pigment, such as whiting, Paris white, or zinc white (oxide of zinc), and has heretofore been prepared by painters by soaking the glue, dissolving it in water, and adding the white pigment, with or without some coloring material. As, however, different lots of glue vary in strength, and the strength is unknown to the user without experiment, a loss of time, and perhaps material, in its preparation occurs.

The applicants say:

Another difficulty in the preparation of calcimine arises from the fact that different proportionate quantities of glue for the same quantity of other material are required, according to the nature of the work for which the calcimine is to be used. Thus, for example, if the calcimine is to be used upon a wall that has never been calcimined nor sized, a larger quantity of glue is required than in the preparation of calcimine for a wall that has been calcimined.

Applicants further say:

The object of our invention is to enable calcimine to be prepared for use with rapidity, without experimental trials on the part of the user, and with certainty as to the quality of the prepared article, whether it is to be fixed for an old wall or a new one. To this end our invention consists of a package containing the requisite quantity of the materials required for preparing a certain quantity of calcimine for use, with the glue in a separate paper (placed by preference inside of the package), in quantity sufficient to render the calcimine suitable for a new wall, and in such a condition that it is readily soluble in water

Applicants further claim:

The prepared calcimine powder, having the glue separated from the coloring material, substantially as heretofore set forth, the same being a new article of manufacture.

I have thus quoted from the applicants' specification and claim, from the fact that the attorney for applicants has ably and persistently insisted that their invention is new and worthy of patents. I am of the opinion that the reference to Johnson's patent is well taken, and the applicants are fully anticipated. The Board of Examiners-in-Chief upon this case say:

The object of applicant's invention is to provide the material, for calcimine painting, dry, pulverized, and put up in convenient packages for the trade. All that is necessary to be done to prepare the powder for use is simply to add the proper quantity of water. Johnson does the same thing, the only difference being that in his packages the glue and pigments are mixed, and those of applicants the glue is put in a separate paper, but inclosed in the same package. This does not appear to be a material difference, and we must therefore affirm the decision of the principal examiner.

Applicants' mode of putting up their preparation has a single advantage over that of Johnson. It will admit of being compounded in various proportions to suit different cases. But Johnson does not limit himself to any exact proportion. As between the two there certainly is not a patentable difference.

The decision of the Board of Appeals is affirmed.

The Gatling Gun.

When describing and illustrating the Gatling battery gun some months since, we mentioned that Sir William Armstrong & Co. had received instructions from the Government to manufacture a limited number of these important adjuncts of our army and navy, for experimental purposes. It is, however, only recently that the production of these weapons has been proceeded with, on account of the delays which have occurred in determining the diameter of the bore, the nature of the rifling, and the description of cartridge to be used. These points have, however, at length been settled, and the guns at present ordered will be rifled upon the Henry principle, the calibre of the bore being ·45, so that the ordinary service rifle cartridges can be used upon an emergency. Solid drawn cartridges, however, are to form the ammunition of the gun, as it has been found that the Boxer cartridge is liable to have the base torn from the body of the case by the extractor, the metal case being left in the chamber. Thirty-six of these guns have been ordered, a portion being for the War Office and a portion for the Admiralty. When completed they will be distributed in various branches of the army and navy for experimental practice. Should they be found to answer the requirements of the service, their manufacture will be further proceeded with, and any modification suggested by practice will be introduced. It is probable that in some of these machine guns a larger calibre will be adopted by the Government. For certain purposes, such as for use in casemated forts or garrison batteries, the heavier guns would probably prove the most useful. All the weapons are being constructed with the most recent improvements.—*Engineering.*

Leaves.

The *People's Journal* gives the following practical advice to agriculturists: In a short time the frosts, aided by rains and winds, will have scattered a bountiful supply of leaves over the woodland. These leaves can be made to do an excellent service on the farm. They should be carefully raked together in heaps, and drawn to the homestead, where a shed or some place can be found in which they may be stored away. They may be hauled in a hay rack by weaving in some cornstalks between the stakes, close enough to prevent them falling through. A large barn-basket is a convenient thing to load them with, and it will be surprising how many loads may be gathered from an acre of woodland. They make a very excellent bed for hogs, being to some extent the bed provided for them by nature. For sows with young pigs, they are the best bed that can be procured, as there is no danger, when they are used, of the young pigs getting entangled in the bedding and crushed. As a source of manure they are valuable; they rot easily, and have good fertilizing qualities. Elm and oak leaves contain a large proportion of potash, and leaf mold, or the decomposed leaves, makes a valuable addition to the soil of flower gardens, or for potting plants. Where manure is scarce—and where is it not?—leaves should be the first resource whereby an increase may be made.

A Family's Ration.

The Relief and Aid Society of Chicago have adopted the following as the standard daily ration for a family of five persons, the amount to be varied according to the income of of the family from labor or other sources:

Bacon or pork	2 pounds,
Or beef	3 pounds.
Beans	1 pint.
Potatoes	2 quarts.
Bread	3 pounds,
Or flour	2 pounds.
Tea	1 ounce,
Or coffee	2½ ounces.
Sugar	4 ounces.
Rice	4 ounces.
Soap	4 ounces.
Soft coal	¾ tun per month.

THE fire in Chicago had the curious effect of spoiling the "outsides" of nearly two hundred weekly newspapers which are published, hundreds of miles from that city, in Illinois, Iowa, Wisconsin, and Minnesota. One of the leading printers of Chicago did a large business in printing these "outsides" in duplicate and sending them to different places, where the local publishers printed the news on the other side. The farmers who depended upon these sheets for their weekly supply of news must have been puzzled to know how the Chicago fire could have deprived them of their village newspaper while the home office remained intact.

THE Babylonians, having no physicians with whom to consult in case of sickness, adopted a novel plan to obtain relief under such circumstances. They had the infirm brought into the Forum, and those who passed by were asked their opinion as to the nature of the disease. They demanded of each one if he ever had the same distemper, if he knew any one who had had it, and, if so, how he was cured.

WE give in another column an interesting account of a new diving bell, invented in Italy, by Sig. Toselli. Since the realization of their political unity, the Italians have made rapid strides in all the arts of peace and progress. Schools have been established, and institutions opened for popular education in scientific knowledge. Italy has a liberal patent law, and the number of patents granted for new improvements augments every year. The Italians are a generous, ingenious, and progressive race. The population of the kingdom is now twenty-six millions.

KINDLE UP THE FIRES.—Half the diseases that afflict humanity at this season of the year are due to the half chilled condition in which people live. More coughs, colds, consumptions and fevers are produced by sitting in half-chilly rooms, on these days when it seems hardly necessary to build fires, than by all other causes.

A MIND full of piety and knowledge is always rich; it is a bank that never fails; it yields a perpetual dividend of happiness.

NEW BOOKS AND PUBLICATIONS.

REDFIELD'S TRAVELERS' GUIDE TO THE CITY OF NEW YORK. With a Map. New York: J. S. Redfield, 140 Fulton Street. Price, 25 cents.

Those who wish to see the sights of this great metropolis, and find their way with facility to objects of interest, cannot do better than invest in this little volume.

Examples for the Ladies.

Miss C——, of Troy, N. Y., with a Wheeler & Wilson Machine, earned in three years and eleven months, $2308.92; stitching 638,653 collars, the length of seam being 380,602 yards, and the number of stitches 117,102,300, an average of 100,000 a day, and 12,500 an hour. This stitching was all done by foot power, and the machine is still in perfect order. It had no extra care, but was simply oiled and cleaned daily. This amount of stitching by hand, at 30 stitches a minute, would have been more than 20 years' work.

"Burnett's Cocoaine for the hair, once used, recommends itself."—*Christian Freeman, Boston.*

Queries.

[*We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.*]

1.—FISH IN LIMESTONE WATER.—On a tract of land which I own, convenient to this city (Louisville, Ky.), is a natural basin about forty feet deep, containing sixteen acres level, and lying about 500 feet above the level of the river bed. The walls of this basin are of solid rock, from which flows, into the basin, a never failing stream of limestone water the size of an ordinary creek. At the lower end of this basin is an outlet or crevice, which can be filled at an expense not exceeding forty dollars; by filling this outlet the basin would have about fifty feet deep of fresh water in it. Can you give me any information whether this would make a good fish pond, what kind of fish would be best to stock it with, and where such fish can be had?—A. B.

2.—ELECTRIC BATTERY.—I am about to make an electric battery; the directions say that the zinc should be amalgamated, and I do not know how it is done. Will some one please answer in the SCIENTIFIC AMERICAN? Also, what is the best book for instruction in electrotyping?—S. H.

3.—HEATING SURFACE OF BOILERS.—D. B., of N. Y., in answer to my query: "How to find heating surface of boilers," misunderstands me. I wish to know how to go about measuring the heating surface In a common two flued boiler, for instance, how do I get at the area of the flues and surface on which the fire impinges on the bottom of boiler? I simply want a rule how to measure the heating surface.—A. H. G.

4.—HEATING SMALL STEEL ARTICLES.—Can any of your correspondents inform me how to heat small articles of iron rapidly without producing so much scale, either by use of chemicals or by the construction of furnace, in making knife blades and other delicate work?—P. L. S.

5.—ELECTRO-GILDING.—In electro-gilding I have had great difficulty in producing the red or fourteen carat color. Will some one inform me what the recipe for the red gold solution is, or if the solution is the same as the ordinary gold solution, and a different process used for depositing the gold on the work? Or in other words, be kind enough to give me the whole process from the making of the solution to the finishing of the work?—T. W. S.

6.—DISCOLORATION OF BRICKS BY SMOKE.—How can I remove the dark stain of smoke from a brick wall after a fire?—W. B.

7.—CONDENSATION ON WINDOWS.—Will some one inform me of the best method to prevent a show window from sweating? I have ventilated both at top and bottom, and even now, on a moderately cold evening, it is impossible to see through the outer glass. I want to use a light in the window, but cannot, as that makes it worse. Would it not be a good idea to work a small blower underneath, and pass a current of air through?—J. E. G.

8.—NOISELESS BLOWER.—Is there any way to make an old fashioned sixteen inch blower noiseless, without boxing or burying?—L. M.

9.—GLUE TESTING.—Can some one inform me how to test the strength and quality of glues? The old way of testing by setting is not a good test. I want some way of telling what the glue is made of.—T. C.

10.—DAMAGED MIRROR.—Will some of your readers tell me how I can repair a valuable mirror, off which the quicksilver has been rubbed in spots?—E. F. C.

Declined.

Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:

BEECH TREE.—A. K.
BOILER EXPLOSIONS.—J. A. M.
ELECTRO-MOTOR, ETC.—J. T. P.
FIREPROOF SAFES.—J. S.
GUNS SCATTERING SHOT.—J. E.
METALLURGY.—J. T.
NARROW GAGE RAILROADS.—S. & Co.
PSYCHIC FORCE.—C. G.
ANSWERS TO CORRESPONDENTS.—A. H. G.—H. A. W.—H. R. J.—H. S.—J. F.—J. H. G.—J. L.—J. W. C.—L. D.—P. J. W.—R. A. B.—R. C.—S. S. G.—T. E. N. E.
QUERIES.—B. S.—C. D. S.—C. T.—D. J. W., JR.—T. J. R.

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Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4 00 a year. Advertisements 17c. a line.

I want the address of every cabinet maker and every painter in the world. J. Henry Symonds, P. O. Box 57, Boston, Mass.

For Sale—A Gear Cutter, cuts 46 inch dia.—and a Drilling Machine. L. Duvinage, 209 Center Street, N. Y.

Situation wanted by a Machinist of 25 years' experience—has superintended work for 11 years, or wishes to take the agency of a manufacturing establishment. Address D. L. W., care of George Walker, 182 Center Street, N. Y.

Wanted—a sober, industrious man, who is fully competent to take charge of a sash, blind, and door factory. Address Wm. B. Houghton & Son, Little Falls, N. Y.

Grindstone Shafts—to prevent bursting—Mitchell—Phila.

Send ½ oz. Sample,—grit wanted—Mitchell, York Av.—Phila.

Grindstones of every description at Mitchell's—Phila.

Stencil Tools & Steel Letters. J.C.Hilton,66W.Lake st.Chicago.

I have office, storage, and traveling salesmen, and would like a manufacturing agency to handle some standard article, for the west and north west, at wholesale. C. H. Smith, 55 West Lake Street, Chicago.

Wants the best machinery for manufacturing tobacco boxes. Address W. C. Freeman, Louisiana, Mo.

Butter Tub Machinery. Send circulars to Keyes & Co., Newbury, Vt.

Suspender button manufacturers will please send address, with price list, to J. J. Mervesp, Brooklyn P. O., New York.

To Boiler Makers—Water Gauges sold cheaper by us than any other House in the Country. Holland & Cody, No. 8 Gold st., N. Y.

Manufacturers of mowing machines, hay rakes, and presses, corn, cotton planters, cultivators, gang plows, please send circulars and lowest cash prices for dealers, to H. Miller, Bellville, Austin County, Texas.

Wanted, the address of manufacturers of dry lint, or flock from linen rags, or of machinery for that purpose. James Gray, 151 Eagle Street, Albany, N. Y.

Baxter's Adjustable Wrenches fit peculiar corners where no other will work. All first class mechanics need one. Baxter Wrench Co., 18 Park Place, New York.

Fire proof Safe Patent for Sale.—This ingenious and valuable invention affords greater protection against fire than any ever devised, while at the same time the safe is perfectly dry. For circulars, address T. Hyatt, 6 Wooster street, N.Y.

Taft's Portable Hot Air Vapor and Shower Bathing Apparatus. Address Portable Bath Co., Sag Harbor, N.Y. Send for Circular.

Shoe Peg Machinery. Address A. Gauntt, Chagrin Fall, Ohio.

We will remove and prevent Scale in any Steam Boiler, or make no charge. Geo. W. Lord, 107 Girard ave., Philadelphia, Pa.

Use Soluble Glass for fireproofing Wooden Pavements, Shanties, R. R. Bridges—also as common hardening Mortar and Cements, makes most durable Stove and Foundry Putty, Iron Cement. Apply to L. & J. W. Feuchtwanger, Chemists, 55 Cedar street, New York.

Builder's Scaffold—Patent for Sale—For further particulars, address Redick & Kunkle, Butler, O.

For Steam Fire Engines, address R. J. Gould, Newark, N. J.

The Oil used on all the Machinery at the A. I. Fair is from Chard & Howe, 134 Maiden Lane, New York. Ask them how it works.

Walrus Leather, for Polishing Steel, Brass, and and Plated Ware. Greene, Tweed & Co., 18 Park Place, New York.

Turkey Boxwood pieces for Sale, suitable for engravers and fancy turners' use. Address Stephens & Co., Riverton, Conn.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.

The best lubricating oil in the world is Winter pressed Sperm. Sold in bottles, cans, and barrels, by Wm. F. Nye, New Bedford, Mass.

Vinegar—how made—of Cider, Wine, or Sorgo, in 10 hours F Sage, Cromwell, Conn.

Best Oak Tanned Leather and Vulcanized Rubber Belting. Greene, Tweed & Co., 18 Park Place, New York.

To Cotton Pressers, Storage Men, and Freighters.—35-horse Engine and Boiler, with two Hydraulic Cotton Presses, each capable of pressing 35 bales an hour. Machinery first class. Price extremely low. Wm. D. Andrews & Bro., 414 Water st. New York.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W.D.Andrews & Bro,414 Water st.,N.Y.

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N.Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada, Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Blake's Belt Studs. The cheapest and best fastening for Rubber and Leather Belting. Greene, Tweed & Co., 18 Park Place, N.Y.

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Ct

Diamond Carbon, of all sizes and shapes furnished for drilling rock, sawing and turning stone, conglomerates, or other hard substances also Glazier's Diamonds, by John Dickinson, 64 Nassau st., New York.

Glynn's Anti-Incrustator for Steam Boilers—The only reliable preventive. No foaming, and does not attack metals of boilers. Price 5 cents per lb. C. D. Fredricks, 587 Broadway, New York.

The Greenleaf Grate Bar saves fuel, and lasts much longer than the ordinary bar. Address Greenleaf Machine Works, Indianapolis, Ind.

To Ascertain where there will be a demand for new Machinery, mechanics, or manufacturers' supplies, read Boston Commercial Bulletin's, Manufacturing News of the United States. Terms $4.00 a year

Answers to Correspondents.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisements at 1·00 a line, under the head of "Business and Personal."

ALL reference to back numbers must be by volume and page.

J. S. writes us from Chicago as follows. We give his language *verbatim et literatim.* "Ive heerd tell on masheens for purpetual motion. A Friend of mine got this thing wich i inclose and said it kept agoing all the time if yn put it on a table or anything it will move around as yu will see when yu tri four yurself. i am a poor man with eight smal chilren and wife to take care off. if i could get a patent for this thing it would happen make me a ritch man i dont think such a masheen has ever been sot up before as i know on like this i have not got another masheen like this so plese dont spoil it unlest yu cant help it to patent it by, as i must have this pattern to git more. can yu plese tell me soon if i can git a patent and how. plese have patients with it and let me know about it soon. can yu tell thro yur paper the SCIENTIFIC AMERICAN wich i read regly. P. O.—Plese answer me very soon thro yur paper." . . . With the above letter came a large sized angular seed, which, on being placed upon a table, moved about thereon in quite a lively manner, forming a very curious object. The movement, which our correspondent supposes to be perpetual motion, is due to the wriggling of a caterpillar contained within the shell of the nut. It is the larva of one of the tortricidæ or "leaf rollers"—a family of nocturnal lepidopters. The tortricidæ are related to and do not differ much, except in size, from the clothes moth. The wings are banded, often with brilliant colors, and are folded roof-like over the body. The larvæ or caterpillars are cylindrical, with sixteen minute legs, and usually dwell in leaves which they roll up by means of silken threads; but some infest seeds and fruit buds. Certain species are very destructive to vines, apples, and grain. Those inhabiting seeds, as in this case, enter by an imperceptible opening, while very small, the mother moth laying her eggs on the seeds before they are ripe. The seed becomes the caterpillar's lodging place and larder, and finally its tomb. But before passing into the chrysalis state, it takes the precaution to bore a hole at one extremity, through which the moth may come out when developed. This specimen is a very singular larva; but it would be impossible to tell the species, unless it was reared to the moth state.

VARNISHING WALNUT FURNITURE.—In reply to M. C. M: In dressing over old furniture, the first thing to be done is to wash it over with lime or soda water, to remove all effects of grease from sweaty hands which will prevent varnish from flowing freely or hardening well. If the work requires refilling, rye flour, wheat flour, corn starch, or Paris white, ground fine in oil and turpentine, will do; but one or two coats of shellac should be laid on and rubbed smooth before applying the varnish. Work finished in oil, without varnish, should be filled with a harder substance than starch. Some use white wax reduced in turpentine; but what is better is a compound of equal parts, by weight, of whiting, plaster of Paris, pumice stone, and litharge, to which may be added a little French yellow, asphaltum, vandyke brown, and *terra di Sienna.* Mix with one part japan, two of boiled oil, and four of turpentine. Grind fine in a mill. Lay the filling on with a brush, rub it in well, let it set twenty minutes, then rub off clean. Let it harden two or three days, then rub smooth, and, if required, repeat the process. When the filling is satisfactory, finish with linseed oil, put on with a brush; wipe off, and rub to a polish with fine cotton; finish with a silk handerchief, or any fine fabric. ——, of ——.

LIQUID GLUE.—To H. W. M. No. 1.—Fill a bottle two thirds full of common glue, and fill up with whisky; cork it up and set it by for three or four days; it will dissolve without application of heat No. 2.—Soak in cold water all the best common glue you wish to make at one time, using only glass, earthenware, or porcelain dishes; dissolve in the same water by gentle heat, then add nitric acid sufficient to give the glue a sour taste, like vinegar, say from ¼ ounce to 1 ounce to each pound of glue. No. 3.—Acetic acid, 1 ounce; pure soft water, 6 ounces; glue, 3 ounces; gum tragacanth, 1 ounce. Mix, and, if not as thick as required, add a little more glue.—AUNT CLARA.

SKELETON LEAVES.—To J. V. M.—Steep the leaves in rain water, in an open vessel, exposed to sun and air. Water must occasionally be added to compensate for loss by evaporation. The leaves will putrify and the membranes begin to open; then lay them in a clean white plate filled with water, and with gentle touches take off the external membranes, separating them cautiously near the middle rib. The process requires a great deal of patience and considerable time for the tissues to decay and separate. Or, for a quicker method, take a tablespoonful of chloride of lime in a liquid state, mixed with a quart of soft water. Leaves, or seed vessels of plants, should be soaked in the mixture about four hours, then well washed in a large dish filled with water, and left to dry, with free exposure to air and sun. Some of the larger species of forest leaves will require to be left rather more than four hours in the mixture.—AUNT CLARA.

PENCIL LEAD.—To H. J.—The easiest way of producing not only black lead, but all sorts of pencils, is by the following process which combines simplicity, cheapness, and quality. Take white or pipe clay; put it into a tub of clear water, to soak for twelve hours, then agitate the whole until it resembles milk; let it rest two or three minutes, and pour off the supernatant milky liquor into a second vessel; allow it to settle, pour off the clear water, and dry the residue on a filter. Then add black lead in any quantity. Powder it, and calcine it at a white heat in a loosely covered crucible; cool, and most carefully repulverize; then add prepared clay and prepared plumbago, equal parts. Water to mix. Make into a paste, and put into oiled molds of the size required; dry very gradually, and apply sufficient heat to give the required degree of hardness—the pieces to be taken carefully from the molds and placed in the grooves of the cedar. The more clay and heat employed, the harder the crayon; less clay and heat produce a contrary effect. The shade may also be varied in the same way. The molds must be made of four pieces of wood, nicely fitted together.—AUNT CLARA.

CLEANING BRASS.—In your issue of October 14th, Vol. XXV., G. N. K. asks for a recipe for cleaning brass. I have been a locomotive fireman, and have used the following with much success: Take one tablespoonful of oxalic acid, add one half pint soft water, and then add a small package of tripoli (such as you buy for ten or twenty cents), or, say two good table spoonsful. This will bring a beautiful polish. Allow the mixture to remain on a few minutes, and wipe off with dry waste or woolen rag.—A. G. H., of Mo.

INDELIBLE PRINTING INK.—W. E. C. (query 23, Sept. 23rd), can make this by mixing 1 pound varnish (such as is used for ordinary printing ink), 1 pound black sulphuret of mercury, 1 ounce nitrate of silver, 1 ounce sulphate of iron, 2 tablespoonsful lamp black. Thoroughly grind together, adding enough turpentine to reduce to the requisite consistency.—A. L. D. M., of Texas.

W. G., of Va.—White lead or zinc paint, upon a roof used to collect water for culinary purposes, would, in our opinion, be apt to contaminate the water.

APPLICATIONS FOR EXTENSION OF PATENTS.

SEED PLANTER.—James D. Willoughby, Vineland, N.J., has petitioned for an extension of the above patent. Day of hearing, January 24, 1872.

CANE GUN.—J. F. Thomas, Ilion, N.Y., has petitioned for an extension of the above patent. Day of hearing, January 10, 1872.

MAKING BLADE FOR PENCIL SHARPENER.—Walter K. Foster, Cambridge, Mass., has petitioned for an extension of the above patent. Day of hearing, January 10, 1872.

PLATE FRAME FOR PHOTOGRAPHIC CAMERA.—William Lewis and William H. Lewis, Brooklyn, N. Y., have petitioned for an extension of the above patent. Day of hearing, January 17, 1872.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

CANE STUBBLE HOE.—Gustavus H. Wright and Amory K. Johnson, of New Orleans, La.—The ordinary plantation hoe, although extensively used, is not well adapted for the cultivation of sugar cane when the latter is in the condition known as stubble cane, and the object of the present invention is to furnish an implement every way calculated for that purpose. It consists in a hoe with three (more or less) broad tines. and with a cutting edge on the opposite end. The plate of the hoe, below the edge at the end of the teeth, is longer than the ordinary hoe, and is whole or entire for nearly half that length. The teeth or tines are formed by cutting out portions of the plate, leaving the tines about the same width as the portions cut out. The ends of the teeth are beveled to a point. The cutting blade is above the eye, of any desired width and length, it being an elongation of the plate, beveled to an edge, which adapts the hoe for cutting weeds and similar purposes. Stubble cane requires a peculiar system of culture and peculiar implements to cultivate it to the best advantage. This hoe is claimed to be perfectly adapted to the purpose, and to meet a want which has long been felt by sugar planters.

DEVICE FOR DISCHARGING GRAIN FROM RAILWAY CARS.—Samuel W. Hawes, of Jersey City, assignor to Richard W. Hawes, trustee, of Hohokus, N. J.—This invention consists in the improvement of devices for discharging grain from cars, usually discharged into elevators or into vessels or barges at the docks. To provide for the varying hight of the tide, on tide water, it is necessary to have the delivery spouts made adjustable or removable. Such an adjustable spout is provided with an endless apron, by which, when suitably actuated, the grain may be elevated or carried on a level. Ordinarily, the spout is made in two parts jointed together, so that the outer or delivery end may be raised or lowered, as may be found convenient, to suit the point of delivery. The spouts may be made in any form, open or closed, and when it is necessary to move the grain horizontally, or even to elevate it, the revolving endless apron may be combined with the delivery spout. In an ordinary car, the valve tube will be from twelve to fifteen inches in diameter, so that a car load may be discharged in three or four minutes, the delivery spouts being, of course, made in proportion as to size. This improvement may be applied to wagons as well as to cars, and its advantages over the ordinary mode of delivery are many and obvious.

COFFIN.—Samuel Avery, of Phœnix, N.Y.—This invention is an improved manner of joining the end and side pieces of burial caskets, and other articles made of wood, at the corners; by a curved metal plate, comprising a quarter of a circle, more or less, according to the angle to be formed by the pieces to be joined, with a flange on the inside near each edge. The plate is fitted upon the outsides of the boards, with its flanges in deep grooves formed across the boards for them, and a key is driven between the ends of the boards; or the boards are so fitted as to force the walls of the grooves against the flanges in such a manner as to bind and lock the corners very securely together. The object of the improvement is to provide a more simple and economical mode of securing the sides and end pieces together than the present modes; also, a mode by which the case may be readily put together, after the boards have been veneered, polished, etc., without scratching and injuring them, and to provide ornamental covers of elaborate design cheaply, which may be produced in the castings of the said plates.

BALE TIES.—J. F. Rusling, of Lawrenceville, Pa.—This improvement, in ties or fastenings for baling cotton, straw, hay, and all similar articles, consists in a lever, curved at its fulcrum end, and having a slightly spiral or irregular form at its free end, by means of which the ends of the bend are brought together by a lever purchase, and the fastening made secure by passing the long end of the lever beneath the band or wire, thereby giving a constantly increasing leverage as the long end of the lever is brought down to the band. In this manner the band is strained tightly around the bale in the act of fastening the tie. The lever is made slightly spiral, or so curved near its long end that when the end is tucked under the band, it rests in the curve, while the strain at the point of resistance (near the fulcrum) makes the fastening complete. The operation, where a flat or hoop band is employed, is the same in effect, but a link is not used, the ends of the band being simply perforated, and a wire attached. In fastening, the band slides in the curve of the lever with the effect before stated, and the end of the lever is tucked under the wire. The long end of the lever is readily disengaged by a slight blow of the hammer or with an awl or spike, when the elasticity of the bale will throw the ends asunder and loosen the band without cutting or otherwise injuring the tie.

COAL BOX.—Charles W. Coffin, Pittsburgh, Pa.—This invention relates to a box for handling coal on steamboats or elsewhere, constructed so as to combine lightness with durability and convenience.

PICKET FENCE.—Charles H. Strowger, Webster, N. Y.—This invention relates to a picket fence, supported upon horizontal wires, stretched between posts placed one at each end of the fence, the invention consisting in the manner of connecting the supporting stakes or braces with the upper set of wires.

DOOR FASTENER.—John Pool, Elizabeth City, N. C.—This invention relates to the combination of an ordinary door fastener or pivoted hook with a driving spike or shank, in such a manner that the former may be turned freely in the slot of the latter, and the device as a whole rendered applicable to right and left hand doors, and in corners, angles, etc.

THILL COUPLING.—James W. Oulton, Amherst, Canada.—This is a simple, strong, durable, convenient, and cheap thill coupling, so constructed as to hold the thills securely when in a working position, and which will allow the thills to be instantly detached when raised into a vertical position. A yoke passes beneath the axle and receives the arms of the clip. The forward end of the yoke is extended, and has a cross head formed upon it. The cross head is perforated longitudinally, and is made open upon its upper side to receive the cross head of the thill iron. The forward side of the cross head of the yoke has a deep notch formed in it to receive the thill iron, and has rearwardly projecting lugs formed upon its edge to keep the cross head in place when the thills are in a working position. The cross head of the thill iron is made round to fit into the cavity in the cross head of the yoke, and has notches formed in it, in such position that, when the thills are raised into an upright position, the said notches may be in proper position to receive the lugs of the yoke, so that the cross head of the thill iron may be conveniently slipped into the cavity of the cross head. By this construction, when the thills are in a working position, it will be impossible for the coupling to become detached, and at the same time the coupling will have a long bearing.

POWER HAMMER.—Isaac Althouse, Columbus, Ohio.—This invention consists in having the upper end of the hammer rod, which works in vertical guides connected to the crank employed for lifting the hammer by a connecting rods composed of two sections, jointed together at or about the center, in such manner that the crank will have freedom to pass the center in the lowermost part of its path without obstruction, the said jointed rod at the same time affording a short positive connection of the hammer stem with the crank, which is simple and cheap to make, and works with but little friction or noise. These two sections are long enough to let the hammer strike on the anvil before the crank comes to the vertical line; then they double on the joint to some extent and let the crank pass the center freely. The same action takes place when there is anything on the anvil to be hammered, whether thick or thin. The arrangement provides a simple, cheap, and efficient positive connection, requiring but little space between the hammer stem and the crank.

SHIELD AND TOWEL RACK FOR WASH STAND.—John M. Oakley, Green Point, N.Y.—This is a simple and convenient device for attachment to wash stands, to serve as a shield or guard to protect the wall from being spattered with water, and to serve as a rack to receive the towels, which will greatly add to the convenience of this necessary article of furniture.

HORSE SHOEING REST.—George Stansel, Johnsville, N.Y.—This invention has for its object to furnish an improved device for holding the horse's foo while clinching the nails and finishing the foot, and which will hold the foo steadily and securely, enabling the work to be done quickly and well, thus relieving the operator from the labor of holding the foot in the ordinary manner.

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POWDER FLASK.—Andrew Diezel, Omaha, Neb.—This invention relates to a new and useful improvement in a self charging apparatus to be applied to powder flasks, and used for similar purposes; and it consists in the construction and arrangement of parts by which to accurately measure the powder and charge the gun by simply pressing the flask into the muzzle and withdrawing it, two motions only being necessary.

LATHE CHUCK.—Charles E. Albro, Fulton, N.Y.—A shank enters the spindle of the lathe by which the chuck is revolved. Upon this shank is formed a chuck bar. Two movable jaws are supported and moved by screws, having each a right hand thread on one end and a left hand thread on the other, and passing through the chuck bar. These screw threads engage with corresponding threads cut in the jaws. Each screw has a cog wheel upon it, and an intervening wheel, by which the motion is conveyed from one screw to the other; but the intervening wheel may be dispensed with, if desired, and the two wheels be made to engage directly with each other, or be used ndependently of each other. These gear wheels work in a slot or mortise in the chuck bar. By this arrangement the screws have no longitudinal movement, and, by virtue of the right and left hand threads in the jaws, the rotation of the screws will carry the jaws toward or from the center, according as the screws are turned, thus bringing a drill or other tool or article to a true center by simply turning a wrench on either of the ends of the screws. In the ends of each of the jaws there is a V shaped recess for receiving the shank of a drill or other tool, a screw tap or nut, a bolt for cutting screw threads, or articles for being drilled, bored, or turned by stationary drills or turning tools. The main object in using two screws is to move the jaws parallel with each other to and from the center. A single screw with the right and left hand threads will move the jaws, and some device other than the second screw and the gearing may be employed for keeping the jaws parallel

BALE TIE.—John Spraguen Davis, Louisville, Ky.—The body of this tie consists of two short curved side bars connected at their ends by two cross bars. The inner edges of the middle parts of the side bars project inward to form lips, which, in connection with the side bars, form seats for keys. The outer sides of the keys have an edge or acute angle formed upon them to fit into the seat formed for them between the side bars and the lips of the end bars. The ties are applied by bending the ends of the bale bands into loops which are passed down through the tie, and through which the keys are passed. When strain comes upon the band the curvature of the side bars forces the keys close against the lips of the end or cross bars, clamping the ends of the bands between the said keys and lips with a force proportioned to the strain upon the bands. The rounded form of the keys prevents the ends of the bands from being bent so sharply as to make said bands liable to break under the action of cold or when bent cold.

ANIMAL GAG.—W. H. Harrison Hallock, Mattituck, N.Y.—A ring, of metal or other suitable material, is of sufficient size to permit the arm of the attendant to pass through after the ring has been inserted in an animal's mouth for the purpose of administering medicine or extracting any substance which may be lodged in the animal's throat. Projecting from the sides of the ring are two ears, and pivoted to the latter is a curved cross bar provided with a handle. The said cross bar is also provided with an aperture at one end, which permits it to pass over the extremity of one of the ears, upon which is a screw thread, the cross bar being held upon the ear by a nut, as shown. The opposite end of the cross bar is flattened and fits within a slot in the other ear, being secured therein by a screw pivot, which passes through the ear and through the cross bar. When it is desired to change the space between the ring and cross bar the pivot is removed, and the bar moved in the slot until the pivot can be passed through another aperture in the ear. This adjustability of the cross bar adapts the instrument to the varying sizes of the jaws of different animals. In some cases, when the animal is unruly or vicious, and it is desirable to hold the head of the animal firmly to prevent lateral movement thereof, adjustable side bearers are pivoted at their lower ends to the ears. The bearers press on the sides of the animal's mouth. The various parts of the instrument that come in contact with the animal's mouth are to be covered with rubber, or other suitable material, to protect the animal from injury.

PRIVY SEAT COVER.—William Street, New York city.—This invention has for its object to improve the construction of privy seat covers, so that, when open, they may have the upper side of the seat cover turned forward, so that any dampness or frost that may collect upon the lower side of said seat cover may be turned away from the person using the seat; and it consists in the construction and combination of the various parts of the seat cover. By this construction, when the covers are turned back, they are raised and moved back, their rear edges being raised the highest, so that they will take a position with their upper sides forward, the lower or damp side of the cover being thus turned back.

REVOLVING FLOWER STAND.—Thomas Leslie, Brooklyn, N. Y.—The object of this invention is to furnish a convenient apparatus for supporting flower pots and watering the same, and which may be used for various other purposes. The pots are sustained on limbs from a revolving column, which revolving brings the pot under a rose sprinkler, the water flowing from a suitable reservoir. Cups in which the pots stand collect the surplus water, and it is conducted through the hollow limbs or branches into a suitable reservoir. The apparatus is modified in various ways that do not affect the general plan.

FIRE ALARM.—Henry L. Brower, New York city.—The present invention is designed to render more useful a fire alarm for which letters patent were granted November 15, 1870; and for this purpose an alarm movement, connected with a delicately constructed thermostat and mechanism, is placed on each floor of the building (preferably in the halls of the different stories), and connected together by this apparatus now devised, so that when, by reason of the raising of the temperature from a fire in any one hall or story, the alarm will be given in each hall at one and the same time. To accomplish this the inventor employs an alarm movement and thermostat spring, with a dial plate and finger, which may be adjusted to indicate any degree of temperature, which will enable the spring to liberate the movement and give the alarm. With this alarm on each floor of a dwelling, arranged as described, a fire cannot occur on any floor, or get under way sufficiently to raise the temperature of the atmosphere two or three degrees without notice to the inmates throughout the house, thus allowing them time to make their escape, if not to extinguish the fire.

SAWING MACHINE.—James Anthony Elston, Elston Station, Mo.—The principal feature of this invention, is the attachment, to a reciprocating saw, of a jointed saw frame, of horseshoe form, to either arm of which the saw may be attached, the two arms being connected at the extremities by a vertical arc bar, the whole being designed to adapt the saw for cutting large or small timber. Also, a frame or table, combined with wheels and braces, arranged on the outside of the table, to give it firm support, constitutes a part of the invention. By means of the horse shoe formed jointed saw frame, the machine may be used for cutting down trees as well as for cutting logs.

PRINTING PRESS.—Robert J. Coons, Greensburg, Pa.—We would be glad to give our readers some idea of the details of this invention, but it is of such a nature that it would be useless to attempt it in such a notice. The press is designed for job work, and is undoubtedly a good one. It is very compact, entirely automatic in its performance, and its parts are such as will enable it to be made in a strong and substantial manner.

PERMUTATION LOCK.—Daniel L. Tower, of New York city.—This appears to be a substantial and reliable lock, capable of a great variety of combinations, through the agency of devices which cannot be described without diagrams. Lockmakers will be able, however, to refer it to its proper class by the enumeration of its parts, which are a jointed bolt, rack bar, two pinions, a bar having an arm and finger attached, a disk with a cam groove, a grooved disk shaft, and a spring staple, together with other parts upon which no claim is based.

ALARM LOCK.—Jackson T. Taylor, Newnan, Ga.—This is an improvement in door locks, whereby an alarm bell is struck whenever burglars attempt to unlock it. The hammers which strike the bell are worked by spring levers, and the lock is permutable, so that it can be set upon a great variety of combinations. Provision is made for unlocking the lock in the dark, by the sounding of the bell, which indicates when the knob has been turned properly in either direction to correspond with the combination, the strokes of the bell being counted by the operator.

CASTER FOR SEWING MACHINE.—George K. Proctor, Salem, Mass.—This is an application of casters to the legs or frames of sewing machines, tables, stands, and the like, by means of levers, in such a manner that by pushing a lever downward by the foot, the support of the table or machine will be quickly shifted from the feet or legs to the casters to admit of moving the said machine or table about the room readily. The invention consists in the arrangement of these levers, the largest being pivoted to one of the end frames, carrying a fulcrum caster, and journaled at the other end in the two shorter levers, which are placed or pivoted perpendicular thereto. When the foot piece is so forced down, it springs under a catch, which holds it until disconnected by hand to lift the casters off the floor and let the table down upon its legs again.

HARVESTER.—Harry H. Bridenthall, Jr., New Derry, Pa.—This invention has for its object to improve the construction of harvesters and mowers, so as to make them more convenient in use and more effective in operation, causing the cut grain to be deposited in gavels at such a distance from the standing grain as to be out of the way of the machine in its next round. It consists in the construction and combination of various parts, to explain which diagrams would be necessary, but which are well adapted to accomplish the end sought.

DEVICE FOR CUTTING STENCIL PLATES.—This stencil cutter is made of brass or other suitable material, cast of rectangular or other form and suitable size. The cutter is made of cast steel, and so formed as to produce the aperture for the desired letter or mark when applied to the material to be cut. The cutter is affixed to the plate by fitting its upper part into the mold wherein the plate is cast, so that eventually the two will be firmly united by casting. In this manner the cutter is cheaply made of best material, it being unnecessary and too expensive to use steel for the body, while the blade must be made of the hard substance. From the plate projects a tenon of cylindrical or other form, into a corresponding socket of the handle. Within the handle is, at the side of the socket, a clamping spring, which serves to retain the block in place. The block is also perforated over each mark or letter, in order to facilitate the removal of the cut out pieces. In using the cutter the block is secured in the handle, placed upon the article to be cut, and forced down by a hammer blow. The next cutter to be used is then readily substituted in the handle for the first, placed in position, and applied by hammering. The cutting blades for every set of type are of equal length and hight, in order to produce uniform letters. The width of the several blocks is preferably such that, when the material is ruled into equal spaces and one block applied to the middle of each space, the letters will all be equally far apart. Mr. Henry Bolthoff, of Central City, Colorado Territory, is the inventor of this improvement.

SPIKE EXTRACTOR.—William H. Ives, of Luzerne, N. Y.—The ordinary spike drawing claw bar has a round heel, which serves for the fulcrum when the head of the spike is low down; but, after the spike has been drawn a short distance, the bar has to be mounted on a stick, stone, or other object to make it high enough, sometimes having to be blocked two or more times. This is very objectionable, as the blocks are not always at hand, unless carried for the purpose, and they are apt to slip away, and difficult to manage. The inventor therefore applies an adjustable block to the said bar, having two or more points or heels, which may be employed to support the end, having the claws at different hights, said block being made adjustable to bring the lower heel under the heel of the claw bar, and the hight of the two together, or move it away to use the heel of the claw bar alone; also, to move the upper heel towards or from the claws, as may be found desirable. The adjustable block has an aperture shaped to correspond with the form of bar, but slightly larger, so as to allow it to slide freely thereon, by its own gravity, when the bar is placed in a vertical position. A set screw may be employed to prevent the fulcrum block from being dropped off the bar when the tool is not in use.

BALING PRESS.—Thomas E. Marable, Petersburg, Va.—This invention relates to a baling press in which the followers are pivoted to their beams in such a manner that, when the side doors are opened and the followers brought opposite them, the followers may be turned crosswise of the press so as to cause the ends of the bale to protrude at either side, thus enabling the bale to be capped at the ends before running it from the press. The invention also relates to a novel form of ratchet for turning the screws that work the followers.

HORSE COLLAR FASTENING.—Caleb Wheeler, Warsaw, Ohio.—This invention relates to a pair of folding curved metal plates, hinged at their ends to the extremities of a collar open at the top, the upper of said plates having one or more transverse slots, and the lower plate being provided with lugs, springing from its upper side, which enter one of the aforesaid slots when both plates are folded down, thus fastening the two branches of the collar together: said lower plate being also provided with a double spring plate which both assists in raising the upper plate when released from the lower, and also eases the downward pressure of the hames on the horse's neck.

PRINTING PRESS.—John B. Adt, Baltimore, Md.—This invention consists in the means of making the cylinder of a printing press adjustable, so that it may follow the flattened surface in the periphery of the revolving drum to which the form of type, or the stone in lithographic printing, is attached, and produce an uniform pressure thereupon.

BROOM NEEDLE.—Collin M. Cowardin, Gardner Station, Tnnn.—The needle may be of any approved size or form. The eye is formed near the center of the needle lengthwise. It passes through the needle from one side obliquely toward the heel, and has a socket or cavity surrounding it large enough to receive and hold a knob that does not project above the surface. A groove on the other side leads from the eye to the heel, to receive the thread while the remainder of the needle is passing through the stock, to protect it from wear and avoid the friction that occurs when the thread lies on the surface of the needle from the eye to the heel.

HOOF PARER.—Isaac Baker, of Long Branch, Mo.—This invention has for its object to furnish an improved instrument for paring horses' hoofs preparatory to setting shoes, simple and convenient in use, enabling the hoof to be pared quickly and accurately. In using the instrument it is applied to the hoof with the clawed bar downward, and the instrument and hoof are both held with the left hand while the blade is operated with the right hand. By placing the instrument upon the front side of the hoof, the frog may be conveniently pared or trimmed. The knife is so arranged that the forward part or toe of the hoof may be pared easier than the rear part or heel, thus enabling the hoof to be pared level and as it should be for properly shoeing a horse, the main art in horse shoeing being to let the heel stand, pare down the toe, and leave the bottom of the hoof level.

HORSE POWER.—Starns S. Ammons, of Winona, Miss.—In this invention the power of the levers is applied through draft rods and push rods. A spring bar equalizes the power applied in this manner to the wheel. The power is applied directly to the wheel instead of to the shaft in the usual manner. The consequence is that the apparatus is much more strong and durable than it would otherwise be, and the wring and twist on the shaft is avoided, as well as the springing of the arms of the wheel. In applying the power to the shaft in the ordinary way, the inventor claims that a large percentage of the force applied is absorbed in keeping the arms sprung to the required tension to convey the necessary power from the wheel. By his arrangement, he claims, this difficulty is obviated and a large amount of power is saved.

HARROW.—James Wigle, of West Point, Ill.—This invention relates to improvement in the class of harrows composed of sections hinged together in such a manner as to operate more or less independently of each other. The improvement consists in the construction and arrangement of a device for coupling the several harrows, whereby each harrow may rise and fall to accommodate itself to variations or undulations in the surface of the ground entirely independent of the others—that is, without affecting the position or operation of them.

SLATE FRAME.—Henry M. Clay, of Easton, Pa.—This invention consists in a new way of constructing corner pieces for slate frames. The slate frame is grooved on both sides and provided with loops for the purpose of receiving pencils. Elastic corner pieces, made of annular form, with central holes and with projecting wings, are secured against the edges of the frame by glue or in any suitable manner. The advantage of these corner pieces is that they may be firmly applied to the frame and can be hung upon a hook or nail. They may be strengthened by springs imbedded therein.

WELL AUGER.—Hillery R. King, of Poplar Bluff, Ark.—This is a hollow auger for boring in the earth. It consists in providing the lower or cutting end of an auger with a short web or a section of a spiral flange in addition to the continuous spiral, whereby clogging is prevented and a suitable support for two cutters is formed.

CULTIVATOR.—Philip R. Jenkins, of Cottonville, Iowa.—This invention has for its object to furnish an improved cultivator, which shall be so constructed that it may be easily adjusted for use as a riding or walking cultivator, as may be desired. It consists in the construction and combination of various mechanical devices (which cannot be explained in a mere verbal description) forming a light, durable, and evidently effective machine.

HARNESS.—Jonas C. Spooner, of Houlton, Me.—This is a new and useful improvement in breast yoke attachment for harness, which holds the tongue steady while passing over rough ground. To the ends of the breast yoke are attached rings to receive the straps that connect it with the hames or breast collar of the harness. The martingale is passed around and secured to the middle of the breast yoke. To the middle of the breast yoke is also attached a snap ring or hook, which is sprung into the ring attached to the end of the neck or pole yoke; or, if desired, the snap hook may be attached to the end of the pole yoke and snapped into a ring attached to the breast yoke. By this device the tongue will be held steady, even when passing over rough ground, and it will give the horses much better control over the carriage than when they are connected with the tongue in the ordinary manner.

MUSIC LEAF TURNER.—George C. A. Class, of Chicago, Ill.—The object of this invention is to provide a simple and effective attachment to pianos, music desks, and instruments, whereby the leaves of music can be easily turned to either side by a slight treadle motion. The invention consists in a new arrangement of vibrating levers or arms, which are, by cords connected with the treadles, and provided with elastic end pieces for taking hold of and turning the paper by friction, and also consists in the use of a new self adjusting paper holder. The apparatus can be applied to pianos organs, music and reading desks, and similar devices

ROCK DRILL.—John Chapman, Amsterdam, N.Y.—This invention relates to a new machine for revolving and striking the shank of a rock drill, with the object of obtaining an equal amount of effective power to a suitable depth. It consists in the improvement of mechanism for elevating the shaft of a rock drill. The upper portion of the drill shaft, made prismatic, is fitted loose through a disk and cog wheel. The latter receives rotary motion by another toothed wheel from the driving shaft. By this shaft the drill shaft is constantly rotated. From the face of the disk project ears which support pivoted pawls. These pawls have friction rollers at their outer ends, while their inner ends are pointed. The friction rollers rest on a circular stationary track, and revolve thereon around the axis of the shaft, as the disk is being revolved by the same. Above the rollers is suspended from a plate another ring or track, of about the same diameter as that first mentioned. In this track are two pendent cams, and the first named track carries two projecting cams. Whenever the rollers are in contact with the edges of the cams, the outer ends of the pawls are depressed, and their inner ends raised against shoulders of the drill shaft. The latter is thereby slightly elevated, so as to clear the drill from the rock, and then, as the rollers are in contact with the cams, dropped again, having been turned while thus elevated. In this manner the changes of position are effected without undue friction of machinery. The strokes are imparted to the drill shaft by means of a weight, and are subsequent to every slight elevation or the same by pawls, and rather independent of the same; that is to say, the drill shaft is loosened by being slightly raised and lowered, and is then struck by the drop. The machine can be used to drill to a suitable depth by attaching sections to the lower end of the drill shaft, as may be found necessary.

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120,373.—WASHER.—F. A. Farley, Pine Meadow, Conn.
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120,375.—ANIMAL TRAP.—H. S. Frost, Watertown, Conn.
120,376.—REGULATOR.—W. L. Gebby, New Richland, Ohio.
120,377.—PRINTING PRESS.—G. P. Gordon, Rahway, N. J.
120,378.—LIME KILN.—M. Groh, J. V. Weitz, Cleveland, Ohio.
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120,380.—UTILIZING WASTE.—D. W. Hanna, Pittsburgh, Pa.
120,381.—WHIP SOCKET.—J. Heberling, Mt. Pleasant, Ohio.
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120,387.—PITCHER.—G. Ph. Lang, P. Lauster, Allegheny City, Pa.
120,388.—GUN LOCK.—T. J. Massie, Arrington, Va.
120,389.—REIN HOLDER.—C. A. Messenger, Syracuse, N. Y.
120,390.—LATHER BRUSH.—W. H. Miles, Jr., New York city.
120,392.—MADDER.—A. Paraf, New York city.
120,393.—MADDER.—A. Paraf, New York city.
120,394.—DOUGH BOARD.—N. B. Petterson, McGregor, Iowa.
120,395.—FIRE ALARM, ETC.—W. J. Philips, Philadelphia, Pa
120,396.—LOCK.—O. E. Pillard, New Britain, Conn.
120,397.—COMPOSITION.—J. B. Rand, Concord, N. H.
120,398.—TYPE SETTER, ETC.—D. B. Ray, New York city.

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120,399.—ALARM.—A. Q. Ross, Cincinnati, Ohio.
120,400.—CRUSHER. F.B.Schoenstein,A.Klein,San Francisco,C.
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120,402.—LIFTING JACK.—L. P. Smith, Middletown, Pa.
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120,436.—PAPER BOX.—H. R. Heyl, Philadelphia, Pa.
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120,438.—BLASTING PLUG.—J. H. Holsey, Butler, Ga.
120,439.—STOVE.—G. Z. House, New York city.
120,440.—HAY FORK.—C. A. Howard, Pontiac, Mich.
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120,552.—FREIGHT CAR.—T. R. Timby, Tarrytown, N. Y.
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120,561.—TRACE BUCKLE.—A. Worster, Syracuse, N. Y.
120,562.—FEED MILL.—Z. S. Cracraft, Ottawa, Ill.
120,563.—LOCK.—N. Kenny, New York city,

REISSUES.

4,612.—Division A.—MANTEL, ETC.—D. K. Innes and W. W. Magill, Cincinnati, Ohio.—Patent No. 117,294, dated July 25, 1871.
4,613.—Division B.—MANTEL, ETC.—D K. Innes, W. W. Magill, Cincinnati, Ohio.—Patent No. 117,294, dated July 25, 1871.
4,614.—WOOD BENDER.—H. McDonald, Shortsville, N. Y.—Patent No. 31,182, dated Jan. 22, 1861; reissue No. 4,548, dated September 12, 1871.
4,615.—DREDGE BOX.—A. F. Tripp, Buffalo, N. Y.—Patent No. 106,430, dated August 16, 1870.
4,616.—MATTRESS.—E. L. Bushnell, Poughkeepsie, N. Y.
4,617.—Division A.—BARREL FILLER.—S. C. Catlin, Cleveland, Ohio.—Patent No. 99,159, dated Jan. 25, 1870.
4,618.—Division B.—BARREL FILLER.—S. C. Catlin, Cleveland, Ohio.—Patent No. 99,159, dated Jan. 25, 1870.
4,619.—GRIDIRON, ETC.—S. Lee, Taunton, Mass.—Patent No. 118,462, dated August 29, 1871.
4,620.—LOCK, ETC.—J. H. Lyon, New York city.—Patent No. 25,428, dated Sept. 13, 1859; reissue No. 849, dated Nov. 8, 1859.

DESIGNS.

5,326.—CARPET.—T. Barclay, Glasgow, N. B.
5 327.—CARPET.—J. Bouet, Kidderminster, England.
5,328.—BILLIARD TABLE.—L. Decker, New York city.
5,329.—CARPET.—E. Demoussy, Paris, France.
5,330.—CARPET.—C. Dresser, London, England.
5,331 to 5,333.—CARPET.—O. Heinigke, New York city.
5,334 to 5,336.—CARPET.—W. Mallinson, Halifax, England.
5,337 and 5,338.—CARPET.—J. J. Patchett, Halifax, England.
5,339 to 5,341.—CARPET.—H. Robinson, Halifax, England.
5,342.—TYPE.—A. McLeester, Philadelphia, Pa.
5,343 and 5,344.—CHANDELIER.—F. R. Seidensticker, West Meriden, Conn.
5,345.—LATCH.—W. E. Sparks, New Haven, Conn.
5,346.—CHEST HANDLE.—W. E. Sparks, New Haven, Conn.
5,347.—SASH LIFT.—A. Wunder, New Haven, Conn.

TRADE-MARKS.

506.—COMPOUND.—G. M. Denison, Essex, Conn.
507.—SPECTACLES.—J. Diamond, Pittsburgh, Pa.
508.—SALVE.—J. Lovett, Allegheny City, Pa.
509.—FISH LINE.—G. H. Mansfield, Canton, Mass.
510.—FIRE BRICK, ETC.—McConnell, Porter & Co., Scioto-ville, Ohio.
511.—LIQUID SLATING, ETC.—J. D. Wilder, Chicago, Ill.

EXTENSIONS.

STEAM GENERATOR.—F. Latta, of Cincinnati, Ohio.—Letters Patent No. 18,460, dated October 20, 1857.
MELODEON.—S. A. Jewett, of Cleveland, Ohio.—Letters Patent No. 18,399, dated October 13, 1857; reissue No. 1,658, dated April 19, 1864.
CHAIN MACHINE.—L. Toune, of Providence, R. I.—Letters Patent No. 18,490, dated October 20, 1857; reissue No. 928, dated March 13, 1860.
PLANTER.—T. W. White, of Milledgeville, Ga.—Letters Patent No. 18,482, dated October 20, 1857.
IRON SPOON.—G. I. Mix, of Yalesville, Conn.—Letters Patent No. 18,513, dated October 27, 1857; reissue No. 4,506, dated August 8, 1871.

Inventions Patented in England by Americans.

From October 3 to October 16, 1871, inclusive.

[Compiled from the Commissioners of Patents' Journal.]

BOOT FASTENING.—I. J. Saunders, Davisville, Cal.
BRAKE.—C. Westinghouse, Jr. (of Philadelphia, Pa.), London, England.
BUTTON HOLE CUTTER.—J. G. Powell, Philadelphia, Pa.
COMBINED TOOL.—T. Garrick, Providence, R. I.
DIE.—G. F. Champney and J. W. Hayward, Taunton, Mass.
FORGE, ETC.—P. H. & F. M. Roots, Connersville, Ind.
GAS BURNER.—G. E. Smith, New York city.
GOVERNOR.—C. Waters, Boston, Mass.
IRON AND STEEL.—W. W. Wickes, New York city.
IRON AND STEEL.—Z. S. Durfee, New York city.
LANTERN.—A. French, Philadelphia, Pa.
MATTRESS, ETC.—D. V. Crandall, Chicago, Ill.
METAL BOX.—E. P. Bernard (of New York city), London, England.
METER.—A. Almquist, New York city.
PANORAMA.—A. P. M. Jeffers, Allegan, Mich.
PUDDLING MACHINERY.—W. Sellers, Philadelphia, Pa.
RAISING SUNKEN SHIPS.—J. T. Parlour, Brooklyn, N. Y.
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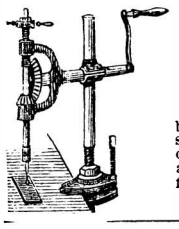

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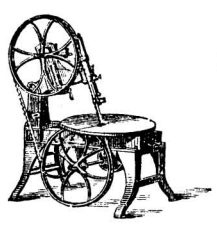

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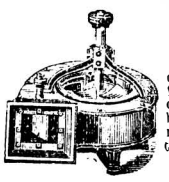

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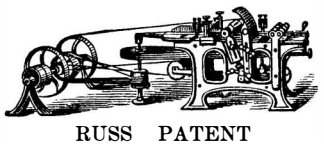

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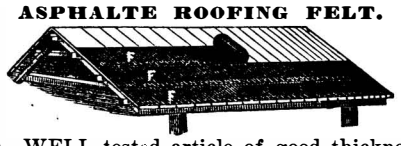

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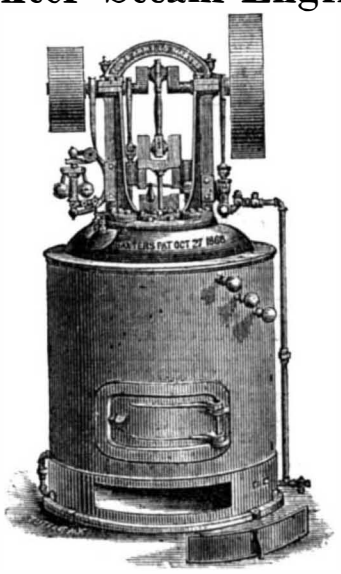

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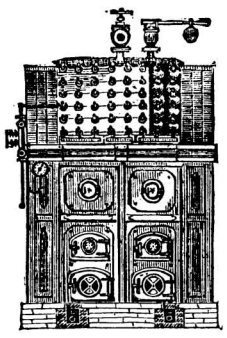

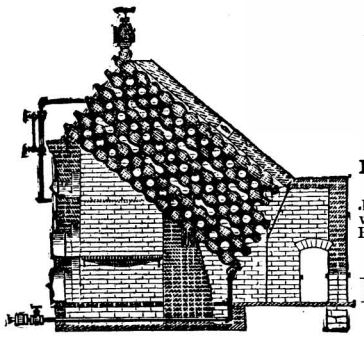

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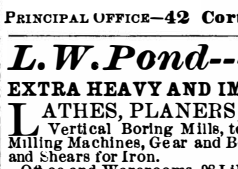

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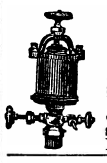

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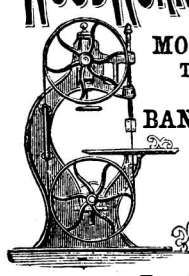

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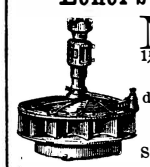

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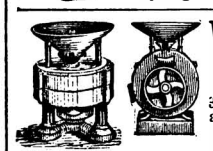

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